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THE SURGICAL USE OF STREPTOMYCIN

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STREPTOMYCIN has only recently become available, and its uses in surgery have so far been experimental. The purpose of this paper is to report on its effect in treating peritonitis, infections of fistulæ and sinuses, and in preparing for operations on the colon. In order to estimate the effectiveness of streptomycin in the body, frequent bacteriological cultures are essential, particularly in view of the danger of inducing resistance to this antibiotic, a danger which is much more marked than with either the sulfonamides or penicillin.

PERITONITIS

The reports in the literature on the treatment of peritonitis have been variable and not as satisfactory as one would have expected from animal experiments. The method of administering the drug has been almost entirely by intramuscular injection, although Keefer[1] in the report on the uses of streptomycin in the treatment of infections mentions the intraperitoneal route in passing. No cases have, however, been reported of this mode of administration. When this method is used, an adequate concentration of the drug is obtained at the site required; and in 10 cases treated by topical application of streptomycin in severe peritonitis there was only one death. This one case was a week old before receiving the drug, and liver damage had already become irreversible; but even here bacteriological success was achieved.

The advantage of topical application of streptomycin over intramuscular injection is that, given intramuscularly, 1 gm. of streptomycin produces a blood concentration of about 10 units per c.c. Even 4 gm. per day give a blood concentration of about 40 units of streptomycin. The concentration in the tissue will naturally be less than this, while the organisms commonly present in peritonitis, such as *B. coli*, proteus and *B. pyocyaneus* may be resistant to streptomycin in concentrations up to 400 units. In view of this situation Dr. F. Smith,[2] bacteriologist at McGill University, suggested trying topical application of streptomycin into the abscess or the peritoneal cavity through a small rubber catheter in doses of 1 gm. per day. This would put 1,000,000 units into the peritoneal cavity, and, allowing for dilution by as much as 1,000 c.c., give a concentration of 1,000 units of streptomycin per c.c., which is much greater than the resistance of the majority of organisms. Working on this hypothesis, several cases were tried.

CASE 1

(L.F.) *Perforation of the common bile duct, causing sub-phrenic abscess.*—During the stormy convalescence after the removal of the gall bladder and the stones in the common duct, penicillin was used unsuccessfully. Streptomycin in 1 gm. doses was then inserted into the abscess cavity on four occasions, causing the disappearance of *B. coli*. Gram-positive staphylococci remained. Penicillin was then given locally, with prompt disappearance of the organisms and healing of the abscess. The *B. coli* had been producing penicillinase, which protected the staphylococci from the action of penicillin.

CASE 2

Sub-diaphragmatic abscess caused by perforated gastric ulcer of 4 days' duration.—Three weeks after the abscess had been drained, antibiotic treatment was instituted, penicillin systemically and streptomycin in gram doses daily into the abscess cavity on four occasions. The last dose of streptomycin was contained in 10 c.c., and could hardly be placed in the rapidly-shrinking cavity.

CASE 3

A perforated appendix with localized abscess in the pelvis and in the right lower abdomen.—One gram of streptomycin was instilled into the abscess, and a culture taken 24 hours later was sterile. The clinical course moved steadily, but somewhat more slowly than a similar case without perforation.

CASE 4

(J.B.) *Acute appendix with perforation and general peritonitis and acute pyelophlebitis.*—This case was treated postoperatively with large doses of penicillin—100,000 units q. 2 h. for one week—with gradual deterioration. When seen in consultation, a culture was taken, which proved to be mainly *B. coli*. Gram doses of streptomycin were given into the cavity daily, and after the second dose the culture remained sterile. This patient's toxicity increased to such an extent that he died of hepatic insufficiency on the 10th day postoperatively. The streptomycin was effective, but the time factor was too great a handicap.

Topical Administration of Streptomycin in Fistulæ and Sinuses

When fistulæ are present it is, of course, necessary to close them by surgery. Here streptomycin is indicated as a preoperative measure. When the fistula has been converted into a sinus, then it is possible to instil the drug into the track in order to control infection during healing. The exact mode of application now becomes a practical problem of keeping the drug in place for an adequate length of time. Unlike penicillin, streptomycin is inactivated by an oily base.[3] Agar was used in two cases, but it proved to be unpractical, because it has to be heated to boiling point in order to dissolve; the catheters, syringes, etc., must be very warm, but the solution cannot be injected into the track until it has cooled down to about 50° C. As it solidifies at just over 40° C., this gives a very small range, and if one is too slow the whole apparatus becomes blocked, whereas if one injects it too soon, the patient may be burned.

Case 5

(A.K.) This patient had multiple polyposis of the colon, which was resected in stages. Since March, 1947, he had had multiple discharging fistulæ at the upper and lower ends of the perineal wound, and a third opening suprapubically. Irrigation of any one opening caused discharge from the other two in this Y-shaped track. As an experiment, streptomycin in agar was used, and after 5 daily instillations, the discharge ceased and cultures were sterile. His condition remained the same for two weeks after cessation of treatment, but as no operation was performed, the discharge then returned.

More recently, I have used powdered streptomycin blown into the cavity and kept in place by oxycel, or fibrinfoam. This method has proved easier and more practical.

Case 6

(M.L.) This patient had bilateral pulmonary tuberculosis, which gradually cleared under treatment, but she was admitted to the Royal Victoria Hospital in 1946 with tenderness in the right loin. The urine was clear, and no organisms were found in it, nor were the guinea-pigs affected. Gastric lavage for tubercle bacillus was twice positive. She was discharged, and at Verdun General Hospital her right kidney was removed in February, 1947, and was found to be tuberculous.

She then developed an abscess at the site of the kidney, which perforated into the bowel. She was admitted to the Royal Victoria Hospital and the abscess opened and drained. Her weight at that time was 60 lb., and there was profuse discharge of fæcal matter from the right loin, and a swinging temperature. While she was being prepared for operation it was found that counts of the organisms showed a higher concentration from the fistula than in the stool, which indicated that the abscess was primarily outside the bowel. At operation this was confirmed. The bowel was closed in the region of the hepatic flexure, and the fistula was excised and packed with vaseline gauze. Streptomycin by mouth lowered the count to 0, and she had a smooth convalescence; her weight increased, and is now over 76 lb. The site of the fistula was treated with local streptomycin, kept in place with oxycel.[4]

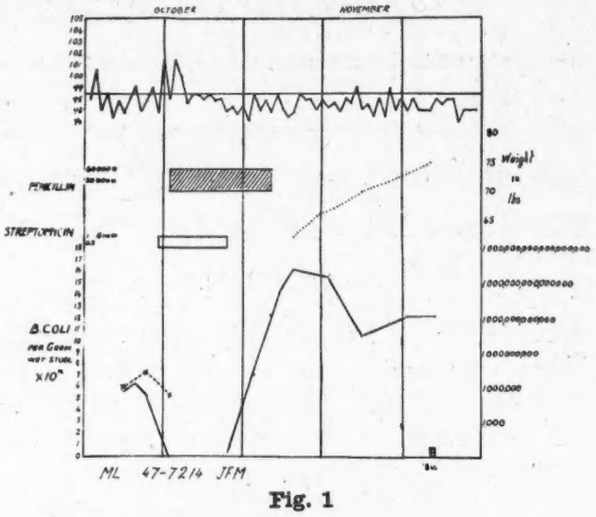

Fig. 1

Use in Bowel Surgery

Approximately 10% of cases of carcinoma of the colon develop peritonitis. This mortality was reduced in England by Abel[5] using sulfonamides, and in America by Crile,[6] who used penicillin in large doses. Penicillin has no effect on *B. coli*, whereas the use of sulfonamides before or along with streptomycin seems to decrease the resistance to streptomycin and to inhibit a greater number of organisms. This suggested the use of streptomycin preoperatively, in order to make the bowel as clean as possible and thus avert peritonitis. In our series of ulcerative colitis treated with streptomycin, it was found that about 50% had no growth.

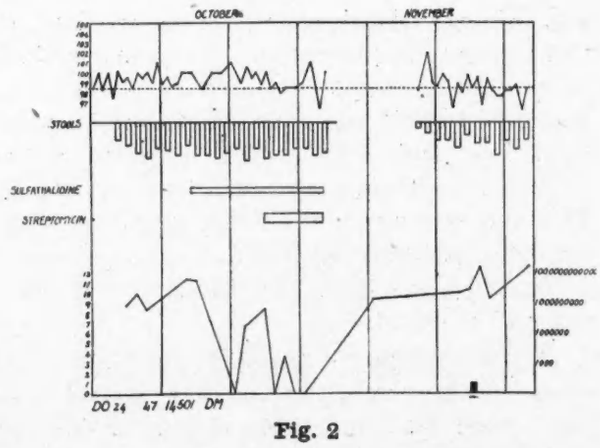

Fig. 2

The next step was to use streptomycin preoperatively, in order to reduce the organisms in the bowel as much as possible. The term "sterilization" has been used, but it is probably misleading. Of course, there are large numbers of organisms in the normal flora of the bowel,

and some of these do not grow on ordinary media, and others only grow anaerobically. These are not easy to culture and identify. Therefore, the most practical method recommended by the bacteriologists is to use the *B. coli* as an indicator of the effect of streptomycin. In several cases we were so successful as to obtain no growth, but in some there was no effect, while in a few the numbers actually increased. This is either due to resistant strains, or else resistance to streptomycin has been induced. One of the ways this can happen is to give continued small doses of streptomycin by mouth after operation, when the bowels are not open, thus giving the organisms an opportunity to become conditioned to the drug. In fact, they become so conditioned that they require it in their diet. One experimenter has suggested that the only way of dealing with this problem is to stop the drug, when the organisms die of starvation!

Several writers recently have referred to a synergistic action of streptomycin, penicillin and the sulfonamides, and Klein[7] claims that giving more than one of the antibiotics diminishes the likelihood of the development of resistance. We, therefore, have been giving the sulfonamides and streptomycin, and, using *B. coli* as an indicator, have counted the number of organisms per gram of wet fæces. These have been charted logarithmically.

CASE 7

(J.R.) *Carcinoma of sigmoid with obstruction.*—This patient had penicillin before and after the first operation and 1 gm. of streptomycin by mouth for 2 days before the second operation. This was started again the next day and increased to 2 gm. per day one week afterwards. Sulfadiazine was given 4 days after the second operation, but none of these antibiotics had any effect on the bacteriological count of the stools, and the resistance rose to over 25,000 units.

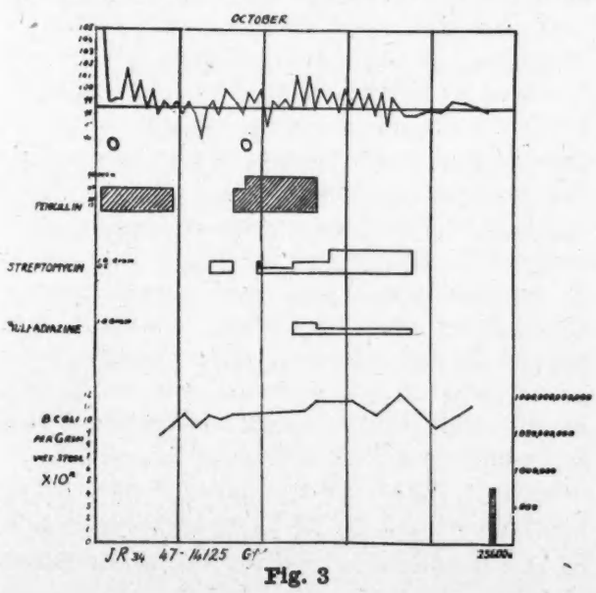

Fig. 3

CASE 8

(C.N.) In October, 1947, in preparation for the closure of a colostomy, she was given 4 gm. of streptomycin daily for 2 days. The bacteriological count in the fæces fell to 0 and stayed down for nearly 2 days, and then rose again to its former level.

Our present routine is to begin the preparation of the bowel for operation about one week ahead, by giving sulfathalidine, and three days beforehand streptomycin by mouth, in doses of 4 gm. per day until operation. The bowel is not usually active again for four or five days, and by this method we have had fewer cases of resistance to streptomycin. The intestine heals quickly and the effect of streptomycin lasts about two days. By this time granulation tissue has begun to form and both the serosa and mucosa have had an opportunity of becoming adherent together at the site of the anastomosis.

This was well illustrated by Case 9 who had a resection of the sigmoid with an end-to-end anastomosis. The nurse, unfortunately, put the oxygen tube too far down, so that the oxygen went into the stomach. The suction apparatus required emptying almost constantly, and could only drain five litres per minute, while the oxygen was being supplied at ten litres per minute. The patient developed surgical emphysema in the abdominal wound, which must have been caused by leakage through the anastomosis into the peritoneal cavity. In spite of this unfortunate incident, she did not develop peritonitis, which shows that the concentration of organisms in the bowel had been reduced below the danger level.

In conclusion it may be said that streptomycin, acting on the Gram-negative organisms, is extremely useful in abdominal surgery. It is most effective when given in large doses, either into the peritoneal cavity, or by mouth, depending on where the concentration of the drug is required. For the prevention of peritonitis after bowel surgery, it should be given preoperatively by mouth in large doses; and for the treatment of established peritonitis it is efficacious when adequate concentrations are obtained by local administration.

I wish to thank Dr. F. Smith, Professor of Bacteriology, McGill University, for his continued help, encouragement, and criticism, and to Messrs. Merck & Company for supplying the streptomycin hydrochloride, Lot 544. My thanks are due to Drs. Gavin Miller, Archibald Wilkie, John Armour, David MacKenzie and Donald Webster, for permission to use their cases.

REFERENCES

1. Committee on Chemotherapeutics and Other Agents, National Research Council. Streptomycin in treatment of infections: report of one thousand cases, *J. Am. M. Ass.*, 132: 4-11, and 70-76, 1946.
2. MORTON, H. S. AND SMITH, F.: In press.
3. ROBERTSON: Personal communication.
4. Annotations: *The Lancet*, 2: 660, 1947.
5. HUNT, A. H.: *Proc. Roy. Soc. Med.*, 39: 549, 1946.
6. CRILE, G., JR.: *Surg., Gyn. & Obst.*, 83: 150, 1946.
7. KLEIN, M. AND KIMMELMAN, L. J.: *J. Bacteriol.*, 54: 363, 1947.
8. MURRAY, PAINE AND FINLAND: *New England J. Med.*, 263: 701, 1947.
9. THATCHER, F. S. AND MACLEAN, J. T.: *J. Urol.*, 57: 902, 1947.

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CHRONIC BRUCELLOSIS: DIAGNOSIS AND TREATMENT*

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MEDICAL observations on the human incidence of brucellosis on this continent represent in the main the work of the past twenty-five years. The conception of the disease as a self-limited condition with a tendency to a prolonged course, in which the diagnosis is determined by the agglutination reaction, has delayed the recognition of the true nature of the disease. We are now coming to realize that the acute severe form represents only a fraction of the cases and that the majority occur in the form of an endemic chronic infection. In such cases the epidemiological history is obscure, the course is intermittent or continuous, the symptoms protean to an extraordinary degree, there are frequently marked psychasthenic reactions, fever may not be evident, and there are no arresting physical signs. When there is added to these features inadequate laboratory diagnostic techniques and the absence of any satisfactory therapeutic agent there emerges the elusive and difficult clinical picture of chronic brucellosis as it exists at the present time.

The increasing numbers of clinical reports and surveys leave no doubt that an unrecognized chronic form of brucellosis is widely prevalent. It must now be regarded as the most common disease transmitted from animal to man.[1] The usual story follows a pattern familiar to all students of the disease. The individual has a mild infection, there is later a flare-up or several obscure febrile episodes. There follow one or more years of ill health, no adequate diagnosis is made, the patient becomes either partially or in some instances wholly incapacitated. In those districts where physicians have become aware of the condition numerous cases have been found. In the Province of Alberta there has been a steady increase in the number of reported cases since 1942 due to the increasing awareness of the disease.[2] Because of these facts there is need for a periodic appraisal of the problem and particularly for a survey of the diagnostic criteria of the disease.

Incidence.—Despite the scepticism in some quarters regarding the prevalence of chronic brucellosis, a review of the surveys which have been made in endemic areas indicates beyond any doubt the wide extent of the disease. In 4,000 individuals tested in Rhode Island (1940) 441 or 10% showed clinical and laboratory evidence supporting a diagnosis of chronic brucellosis.[3] This parallels the results of most studies which indicate that approximately 10% of the population in endemic areas has been invaded by *Brucella*. A varying percentage of this group has the disease in some degree of activity. Admittedly such conclusions rest upon a still imperfect understanding of the clinical aspects of the disease and shortcomings in the use and interpretation of laboratory procedures.

At the same time it should be pointed out that brucellosis has a tendency to become chronic in every species of animal in which it has been studied, and that in cattle, for example, veterinarians find that only from one-third to one-half of those becoming infected ever recover fully.[4] This chronicity of the disease in comparative animal studies is a striking fact. Furthermore a most important feature of brucellosis is the actual invasion of *Brucella* followed by latency of infection. Latent infection from a single exposure has been known to develop into frank disease without intervening symptoms as late as eight years after the initial infection.[5] This phenomenon is also probably responsible for the recrudescence that occurs in patients who have made spontaneous or therapeutic recoveries from manifest and proved disease, coming in some instances after an interval of five years or more of perfect health. This immunological observation is vital to an understanding of chronic brucellosis.

With respect to the use of non-cultural laboratory methods in establishing the index of the incidence of the disease, while inade-

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quacies in the interpretation of these results exist, there is no longer any reason to doubt that the tests—intradermal and agglutination—are specific for brucellosis. Thus the considerable number of reactors which are being found in surveys represents a relatively true situation in indicating the large percentage of the population which has been infected with *Brucella*. In this connection, the analogy with tuberculosis is striking.

With these points in mind we wish to review our experience with a group of 100 cases of chronic brucellosis which have been under treatment for the past two years. All have been subjected to honest scrutiny and have been under observation a sufficient time to enable us to check our conclusions closely and repeatedly.

It is not proposed to discuss the *epidemiology* involved in these cases. This is a very real and complex problem which concerns clinicians, veterinarians and public health authorities acting in co-operation. Our only interest in this particular centres on the fact that the distribution of cases as we have noted them is related to certain areas of this Province where there has been close contact with infected animals or no pasteurization of dairy products. The invading organism in those cases in which it has been recovered has been the *B. abortus*, the bovine strain. There are no complete records to indicate the percentage of *Brucella* infection in cattle and swine in the Province of Alberta but it is recognized as being of considerable extent. As an indication, in 1946, of 4,105 bovine blood samples tested there were 701 positive reactors (positive agglutination reaction in dilution of 1:100 or higher) or 12%.[6] A notable feature of the disease in this Province is the relative absence of cases of infection among abattoir workers. With the large number of people in this stock-raising part of the country employed in handling animals which must be infected, this is puzzling particularly when contrasted with the reports of the incidence among abattoir workers in Iowa and the middle States. To date no explanation of this phenomenon has been forthcoming.

CLINICAL DATA

This series comprises 100 cases of chronic brucellosis accepted after careful clinical study because of the combination of findings and by virtue of the clinical course before and after specific vaccine therapy. Nine of these cases either received inadequate treatment or were lost sight of after some treatment and are not included in the major items of this report. All cases have been under treatment from at least 3 up to 20 months. There was 1 death, a woman 56 years of age under treatment for 13 months with a severe relapsing form of the disease, who as well had recurrent metastatic malignant involvement from a carcinoma of the breast removed some years before.

Sex and age.—There were 36 males and 55 females. Ages ranged from 5 to 65 years. The age groups were as follows: children (15 and under) 4; 16 to 30, 30 cases; 30 to 40, 25 cases; 40 to 50, 23 cases; over 50, 9 cases.

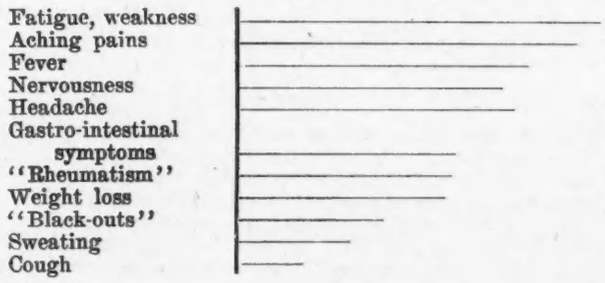
Environment.—City residents, 31; residents of rural towns or villages, 27; resident on farms, 33. There were 2 packing-house workers, 1 veterinarian, 1 cattle buyer. Two cases had been internees in a Japanese prison camp.

SYMPTOMATOLOGY

All these patients were ill and had sought medical care. The duration of symptoms prior to treatment ranged from six months to five years. The more common symptoms are indicated in Table I. The cardinal complaints were weakness (100%) and aching pains (95%). Two characteristics of the complaint of weakness should be noted. It was described as an overmastering tiredness as a result of which

TABLE I.

SYMPTOMS IN CHRONIC BRUCELLOSIS



the patient was unable to carry on with work. There were as well episodic attacks of extreme weakness characterized by many of the patients as "black-outs". The aches and pains followed no pattern and involved both muscles and joints as soreness and stiffness. The nervous symptoms were mainly irritability and emotional instability, with a curious mental depression in

many of the cases. Gastro-intestinal disturbances usually took the form of epigastric burning, flatulence and constipation.

It will be apparent from this list of symptoms why all observers have stressed the difficulty of distinguishing chronic brucellosis from so-called neurasthenia or "constitutional inadequacy". On the one hand Alice Evans after bitter personal experience has pointed out the necessity of excluding the possibility of chronic brucellosis before making a diagnosis of neurasthenia.[7] Conversely it is equally important that the patient with neurasthenia be not regarded as having chronic brucellosis on the basis of the symptomatology and inconclusive laboratory data and observation.

Physical examination.—The physical findings generally speaking were not significant. A peculiar pallor was evident in 10 of the cases. Splenomegaly was noted in 3 cases only.

CLINICAL FEATURES

Brucellosis is now recognized as a disease which may masquerade under many guises. In addition the greatest single obstacle to complete cure of the infection in chronic cases is the tendency of the *Brucella* organism to live on in a focus which keeps up the infection in a low-grade form. Such focal sites are the spleen, the biliary tract and retroperitoneal and other lymph nodes. Certain comments with regard to the localizing character of brucellosis in this group of cases may be made.

Biliary tract.—In four cases of chronic brucellosis to the writer's knowledge positive cultures of *Brucella* have been obtained from the gall bladder, and cholecystectomy in these cases has resulted in a complete remission.

CASE 1

Male aged 46. For two years there had been flatulent indigestion and epigastric discomfort. Concurrent with these symptoms he noticed periodic evening fever and thought he was subject to "influenza" attacks. On hospital admission cholecystograms showed a non-functioning gallbladder with at least one gallstone. Agglutination reaction for *B. abortus* was positive in a titre 1:1,280; the intradermal test was strongly positive. For a month after admission he ran intermittent fever which finally responded to sulfathiazole therapy. Seven weeks after admission cholecystectomy was done, the gallbladder being grossly thickened and adherent to surrounding structures. Bile culture was negative. In the deeper part of the gallbladder mucosa and in the muscle coat there was a chronic granulomatous process containing foci of pus cells and eosinophile leucocytes together with lymphocytes. This picture was highly suggestive of *Brucella* infection and *B. abortus* organisms were isolated from the culture of this material. The patient has shown progressive improvement since the operation.

Joint manifestations.—Of the 100 cases 10 had what may be described at atypical arthritis and 5 of these had received treatment for their disability which had been diagnosed as arthritis. The involvement in these cases was bizarre, the joints swollen and tender. In every instance they have responded to specific vaccine therapy. Although low back pain was a common symptom there were no proved cases of spondylitis. The following case illustrates the arthritic type of the disease.

CASE 2

Male aged 45. For four years he had complained of marked fatigue and stiffness and soreness in most of the joints. He was finally obliged to stop work. The pain in the knees, hands and back became worse and he was treated for months at an institution specializing in arthritis where he failed to improve. He was first seen in October, 1946. The knees and fingers showed very slight swelling. Agglutination reaction for *Brucella* was positive in a titre 1:160, the skin test was strongly positive, the opsonocytophagic index was moderately positive. Treatment for chronic brucellosis was begun and in four months' time his fatigue had cleared and the joints were giving very little trouble. He was able to shovel snow and was working regularly. At present, after one year of treatment he is well and is being maintained on a maintenance dosage of *Brucella* vaccine (T 50 strength) 0.2 to 0.4 c.c. twice a week.

Pulmonary manifestations.—One patient of this group had been in a sanatorium under observation for tuberculosis. There were no cases showing an atypical form of pneumonia.

Marked neurosis.—Illustrating the degree of neurosis which may exist and its response to treatment is the following case.

CASE 3

Married female aged 27. For years she had suffered from extreme fatigue, headache and aching pains throughout the body. She had become completely prostrated and was emotional and depressed. She was regarded as a hopelessly unstable neurotic individual by all who had seen her. On examination there were no localized physical signs. Agglutination reaction for *Brucella* was positive in a titre 1:40, the skin test was strongly positive. Specific vaccine treatment was begun in May, 1947, at first with difficulty because of the patient's extreme nervous instability. After six months of treatment the improvement has been remarkable. She writes, "I am catching up on things I had let slip when I felt so poorly". "I am coming ahead much faster than those that baby themselves."

Neurasthenia.—The following case illustrates the degree of extreme physical and mental fatigue which may afflict patients with chronic brucellosis.

CASE 4

Single female aged 24. For three years she had suffered from increasing weakness, aching pains in the body and joints and extreme lethargy. She had lost 10 pounds in weight and had fever 99 to 100° every day or so. She finally was obliged to resign from her teaching post for a year. For three months she had

been confined to bed most of the time. Physical examination showed nothing significant. The agglutination tests for *Brucella* were negative, the skin test was moderately positive. Specific vaccine treatment was begun in December, 1946, and in three months she was able to return to teaching. With the exception of an occasional flare-up at first she has steadily improved and is now practically well on a maintenance dosage of *Brucella* vaccine twice a week.

Skin lesions.—Various types of skin lesions have been described. In this series one patient showed a macular eruption and two an erythema of the limbs which was aptly described by one observer as a "mercurochrome flush".

LABORATORY PROCEDURES

A clear understanding of the significance and limitations of the laboratory tests in chronic brucellosis is necessary to avoid the confusion and false conceptions which exist at present with regard to such tests. The chief points in this connection are summarized in the following observations based upon our own experience and the investigations of others. In respect to the present group of cases the main findings were as follows (Table II).

TABLE II.

REACTION TO LABORATORY TESTS

Intradermal test:	
Marked	25
Moderate	63
No reaction	3
Serum agglutination test:	
Positive reaction	25
Titre 1:20, 2 cases; 1:40, 6 cases. 1:80, 10 cases; 1:160 or over, 7 cases.	
Negative reaction	66
Opsonocytophagic index (Huddleson) at onset:	
Moderate	11
Slight	5
Negative	75

The intradermal tests were carried out with a 1:10 dilution of Lederle's treatment vaccine (equal parts bovine and porcine strains) giving a suspension of 2,000,000,000 organisms per c.c., 0.1 was injected and the test read in 48 hours up to one week. For the agglutination test Huddleson's rapid plate method was employed using a commercial antigen. The phagocytic test was carried out with a 24 hour culture strain of *B. abortus* organisms. No attempt was made to secure blood cultures in these chronic cases of the disease.

Intradermal test.—This test failed to give a positive response in only 3% of our group of cases. A positive reaction merely indicates previous *Brucella* invasion. Its numerical accuracy is generally agreed to be about 92% in proved cases of the disease. It should be interpreted in the same light as the tuberculin reaction. Hence the intradermal test does not distinguish past from present disease, nor inactive from active infection. It is thus indefensible to make the diagnosis of brucellosis on the basis of a positive intradermal test.

Agglutination test.—In this series of chronic cases the agglutination test was negative in 72%. This is in line with the reports of most observers. It follows that this test cannot be relied upon to confirm the clinical diagnosis, nor, which is worse, does a negative agglutination test exclude the possibility of brucellosis. Furthermore there has been shown to be a difference in the agglutination response with different antigens,[8] agglutinins may appear intermittently at uncertain intervals, and occasionally cross agglutination may occur. In view of the poor agglutination response in chronic brucellosis and the features above noted, there would seem to be little advantage in establishing an arbitrary critical titre level as being diagnostic. The important point is that the test is not a reliable diagnostic aid and that it cannot be used to exclude *Brucella* infection.

Opsonocytophagic index. — The phagocytic study introduced by Huddleson is of small relative value in diagnosis and then only when used in conjunction with other procedures. A strongly positive skin test with a low phagocytic index may indicate that the patient has active infection. We have found it of greatest value in following the course of a patient under treatment when a progressive increase in the phagocytic index is usually commensurate with clinical improvement. Like other observers we have noted aberrant findings so that the procedure must be accepted with reservations.

Blood count.—We have not found that the pattern outlined by Calder and his associates[9] —relative lymphocytosis, leukopenia and a mild macrocytic anæmia—has applied in a sufficient number of our patients for it to be of any particular diagnostic value.

Sedimentation rate.—Like other observers we have found that the sedimentation rate in brucellosis usually remains normal throughout the course of the disease. This is frequently an important aid in differential diagnosis.

Summary note.—Since all the laboratory aids to diagnosis have serious limitations, it seems that the reasonable thing to do is to carry out

all the non-cultural tests and then to relate them critically to the clinical findings. Isolated laboratory findings are worthless.

DIAGNOSIS

The diagnosis of chronic brucellosis is admittedly difficult. In any survey of chronic cases from the clinical standpoint one is impressed by the fact that the subjective findings are conspicuous by their varied range while the objective findings are conspicuous by their absence.[10] From the laboratory standpoint diagnostic tests are limited. In the face of this dilemma, until better criteria are devised, diagnosis must be based upon investigation of all aspects of the case and the final decision rest upon clinical judgment. There must first of all be a lively clinical sense of the possibility that chronic brucellosis may exist in a given case. This should be balanced by the realization that brucellosis is not an acute general infectious illness with a positive agglutination test. The two symptoms which dominate the clinical picture are fatigue and muscle and joint pains. A positive skin test indicates *Brucella* sensitization and serves as a broad guide. This should be set alongside the other laboratory findings and the results considered in relation to the clinical findings, endeavouring to rule out all other diagnostic possibilities. The close resemblance between brucellosis and a psychogenic illness such as neurasthenia must be regarded from both points of view.

As the clinician becomes more familiar with the disease, we feel sure that he will recognize several clinical syndromes which, in spite of the variable nature of the disease, he will come to associate with chronic brucellosis. Only in this way will sound clinical judgment ever develop. As Foshay says:[11] "Better diagnosis of this deceptive disease during the next twenty years will depend chiefly upon a better grasp and understanding of its clinical manifestations and less upon laboratory developments".

TREATMENT

The treatment of chronic brucellosis is most difficult and relatively unsatisfactory. Two factors must be borne in mind in evaluating treatment under any circumstances—the great difficulty in establishing the diagnosis, and the occurrence of spontaneous remissions of varying degree.

The *sulfonamides* in our experience are of little value in the chronic form of the disease except to control acute exacerbations. *Chemotherapy* has no real effect. Although the results of the use of streptomycin in experimental animals have been encouraging, its use in human cases, while inducing a temporary remission in some instances, does not materially affect the course of the illness. *Fever therapy* has given good results in the spondylitis and salpingitis manifestations of the disease, but we have not had occasion to use it.

Specific vaccine therapy constitutes the main attack upon the chronic case. The aims in treatment are desensitization to the *Brucella* protein and the production of antibodies. These ends are best accomplished by the use of killed organisms in a concentration avoiding anything but mild local and systemic reactions. The intramuscular route rather than the subcutaneous is more likely to avoid such reactions. Brucellin of Huddleson which is a filtrate of all three strains of *Brucella* and commercial vaccines we have found to give too great a reaction. Harris reports a vaccine from a *B. abortus* strain of greatest value in his experience.[12]

We have used the detoxified vaccine prepared by Dr. Lee Foshay of the University of Cincinnati. This is a nitrous acid treated *Brucella* vaccine from the *B. suis* strain. We have found it possible to start with a T25 strength as a rule giving 0.05 c.c. in daily injections, gradually increasing the dosage, keeping below the reaction point. Treatment is continued for months, nine to twelve months usually or longer. In the later stages a maintenance dosage is given two or three times a week. The reasons for this prolonged treatment are that the incidence of recurrences is high in cases in which inadequate immunization is obtained, and because of the low antigenicity of the *Brucella* organism, prolonged immune response to vaccine is essential to present relapses.

We have found that the first relief of symptoms is apparent in from six to twelve weeks after vaccine treatment is begun. The criteria of improvement are disappearance of the subjective symptoms, ability to perform work, absence of fever, increase in weight and increase in the phagocytic index. It is freely admitted that this vaccine method of treatment is tedious and makes a great demand upon the patient. The answer is that, until better meas-

ures of treatment are discovered, this remains the only attack upon the chronic entrenched form of the disease which offers any hope of success or improvement. Furthermore it has been our experience that patients need little urging to continue the laborious vaccine treatment after the initial stages because the improvement which occurs is sufficient encouragement to persist.

The duration of treatment to date in the cases of chronic brucellosis under review is as follows: 3 to 6 months, 29; 6 to 12 months, 44; 12 to 18 months, 16; over 18 months, 2. Table III records the results of treatment.

TABLE III.

RESULTS OF TREATMENT

Excellent (arrested cases off treatment)	8
Very good (on maintenance treatment)	29
Good	31
Improvement	18
Slight or no improvement	4
Deaths	1

Of the cases showing marked improvement and on a maintenance dosage of vaccine once or twice a week, 21 had been on continuous treatment for 12 months or more, and 8 for 6 to 12 months. Of 52 cases showing improvement 35% reported a gain in weight, in some cases up to 20 lb.

At the present time about 75% of cases may be expected to obtain a complete arrest of chronic brucellosis with persistent vaccine therapy. In this disease one cannot safely talk about "cures". The disease is not a self-limited one and a relapse may occur after years. In those cases which do not respond to treatment and go on in a chronic relapsing state, it seems likely that the disease smoulders in a focus which keeps up the infection in a low-grade form. We have already referred to such focal sites which act as a reservoir of the disease. In such cases if supported by clinical data, removal of such a focus is warranted. In four chronic cases to my knowledge cholecystectomy in the presence of biliary tract infection has resulted in a complete arrest of the disease. In a few cases in which splenic involvement was suspected, removal of the spleen has given a similar satisfactory result. I have seen one such case recently in which after four years of continuous illness splenectomy produced a complete remission.

In conclusion it may be said that since Hughes's classical communication, *Mediterranean, Malta or Undulant Fever* written in 1897, the perplexities concerning diagnostic and therapeutic problems of the disease have persisted and are now becoming more pointed as the incidence of the disease increases.

SUMMARY

The diagnostic and therapeutic problems of chronic brucellosis are considered in the light of a review of a series of 100 cases.

The disease is widely prevalent. The diagnosis is surrounded with difficulties. In the absence of positive cultures it cannot be established either on clinical criteria alone or on laboratory findings alone but rests on clinical judgment taking into account all factors involved.

The treatment is with specific vaccine therapy over a long period of time, and good results may be expected in 75% of cases.

Better handling of the disease in the future will depend upon a better understanding of its clinical manifestations.

The assistance given by Mrs. Lillian Martin of the Calgary Associate Clinic during the course of this study is gratefully acknowledged. Our thanks are also due Dr. A. P. C. Clark and officials of the Colonel Belcher Hospital for permission to include cases under treatment in the hospital.

REFERENCES

1. BORTS, I. H.: *J. Kansas Med. Soc.*, 46: 399, 1945.
2. SOMERVILLE, A.: Personal communication, August, 1947.
3. DUSTIN, C. C. AND WEYLER, H. L. C.: *New England J. M.*, 222: 670, 1940.
4. EVANS, A. C.: *Am. J. Pub. Health*, 37: 139, 1947.
5. FOSHAY, L.: Personal communication, August, 1947.
6. WILTON, G. S. W.: Personal communication, October, 1947.
7. EVANS, A. C.: *Pub. Health Rep.*, 53: 1507, 1938.
8. FOSHAY, L.: *Am. J. Clin. Path.*, 10: 176, 1940.
9. CALDER, R. M., STEEN, C. AND BAKER, L.: *J. Am. M. Ass.*, 112: 1893, 1939.
10. DARLEY, W. AND GORDON, R. W.: *Ann. Int. Med.*, 26: 528, 1947.
11. FOSHAY, L.: Personal communication, August, 1947.
12. HARRIS, H. J.: *Bull. New York Acad. Med.*, 22: 147, 1946.

It is almost certain that part of the recorded increase in the death rate from leukæmia is spurious, and reflects the more frequent recognition and reporting of the disease. In the past quarter century, physicians have become better qualified to diagnose leukæmia and are more alert to recognize its symptoms. In addition, the development and more widespread use of improved laboratory techniques of blood testing have facilitated the discovery of cases.

THE EXAMINATION OF SPUTUM FOR TUMOUR CELLS*

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THE examination of sputum for tumour cells as an aid to the diagnosis of bronchogenic carcinoma is by no means a new procedure, and is one that we believe is of distinct value. Prior to 1935 sporadic attempts to use this method of examination had little success except in occasional instances where fragments of tumour were expectorated. In that year Dudgeon and Wrigley[1] first reported good results, and subsequently Dudgeon[2] in 1936 and Barrett[3] in 1938 reviewed the results achieved at St. Thomas's Hospital in London. In 1936 Dudgeon[2] reported the investigation by this method of a total of 102 cases, of which 56 eventually were proved to be cases of malignant disease of the lung or larynx. Of the 56, 43 or a total of 76% were diagnosed by examination of the sputum. Two cases of inflammatory disease of the lung proved to have been given a false positive diagnosis. Barrett's[3] report brought the total number of cases diagnosed as positive by this method to 119, and in 1946 Bamford[4] added a further 113 cases so diagnosed at that hospital.

In the literature there are very few other reports of the successful use of this method of examination, notably that of Gowar[5] in 1943, in which 64.3% of positive results were obtained in 65 proved or probable cases of pulmonary neoplasm. In 1943 Wandall[6] in Copenhagen records a total of 30 cases, in which the sputum was positive in 19 out of 22 cases histologically confirmed and in 7 of 8 roentgenologically positive. One case was falsely diagnosed as positive.

There is little in the North American literature regarding this form of examination, and it would appear that it has been little used with appreciable success until the recent past. Two reports of Herbut and Clerf[7, 8] in 1946 detail the microscopic examination of aspirated bronchial secretions. They record a positive diagnosis of cancer cells in 22, or 73% of 30 cases of bronchogenic carcinoma, and in the second communication a positive diagnosis in 25 or 92.5% of 27 additional cases. They find the examination of the bronchial secretions much more satisfactory than that of expectorated sputum, and suggest that by this method many more cases will be diagnosed early. Gowar[5] states that a considerable proportion of early cases may be so diagnosed.

In 1946 Papanicolaou[9] reported positive results in 88% of 25 cases of proved bronchogenic carcinoma and in 1947 Woolner and McDonald[10] from the Mayo Clinic record positive results in 80% of cases using a smear technique. The latter had one case in which a false positive result was obtained and state that false positive results are reported in 1 to 3% of cases.

This review covers the examinations of sputum for tumour cells at the Central Division of the Montreal General Hospital in the two-year period between July, 1945, and July, 1947.

TECHNIQUE

The technique followed is the collection of twenty-four hour or overnight specimens of sputum, or, if abundant, that expectorated upon awaking in the morning. The bulk of this is enclosed in a gauze bag and is fixed in Bouin's solution. Thereafter it is treated as a block of tissue, being embedded in paraffin and sectioned. We use only the routine hæmatoxylin and eosin staining. The sections are rapidly scanned for tissue fragments which may occasionally be present in the sputum, then a more detailed search is made for individual tumour cells or small clusters of these.

In our experience after gaining familiarity with the appearance of the usual cellular components of sputum, *i.e.*, leucocytes, macrophages which may or may not be pigmented, alveolar lining cells, bronchial epithelium and mouth epithelium, these are readily identified. It is worth noting that bronchial epithelium is very often seen in bronchial secretions aspirated through the bronchoscope, but is very rarely identified in the expectorated sputum.

Frequently one sees cells that are not identified and which might or might not be tumour cells. The diagnostic features are those acceptable for carcinoma cells as seen anywhere in the body, namely abnormally large cells with a large or bizarre nucleus which occupies an undue proportion of the cell volume and which is hyperchromatic and may contain single or multiple nucleoli. Mitotic figures may be seen. A single cell with such characteristics may pre-

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sent difficulty but when present, carcinoma cells are frequently seen in small clusters or organoid masses and the diagnosis is then made more easily.

One type of cell seen quite abundantly in the sputum from cases of bronchogenic carcinoma presents some difficulty. By itself it does not have the usual features of a malignant tumour cell, but nevertheless is frequently seen to originate along the surfaces or within masses of bronchogenic carcinoma. These occur singly or in large or small plaques in the sputum, as very elongated and flattened or larger polygonal cells with bright eosinophilic cystoplasm and a relatively small pyknotic nucleus. Their appearance suggests a keratinizing cell but they do not contain keratohyalin granules and do not always originate from tumours of frank epidermoid character. These are, we believe, degenerating tumour cells which are flaking off from tumour surfaces.

One cannot positively say that such cells do not originate from areas of squamous metaplasia in a bronchus or from leukoplakia of the oral cavity, but when seen they are suggestive of a bronchial neoplasm. In our experience when this type of cell is seen incorporated in the sputum, we frequently are able to demonstrate more typical malignant tumour cells in the same or other specimens. In two cases, however, a positive microscopic diagnosis was made on the basis of the finding of such cells incorporated in the sputum in large numbers, and without demonstrating typically malignant tumour cells. Subsequent post mortem examination excluded the presence of neoplastic disease, one case having syphilitic aortitis with chronic cardiac failure, and the second an organizing pneumonia with abscesses and cavitated gangrene of a lung.

We fully realize that in making use of this method of examination we are going to overlook or miss tumour cells in sputum and that

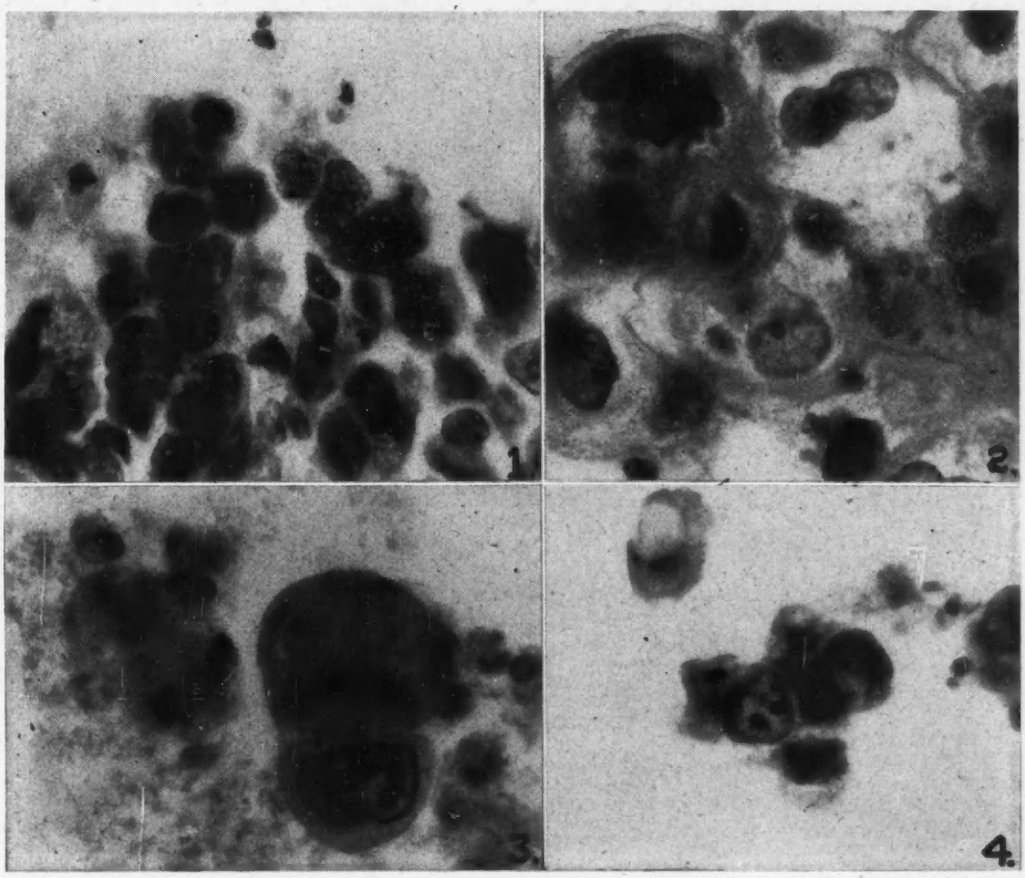

Fig. 1.—Dense cluster of carcinoma cells in sputum. Note nuclear characters with coarse chromatin, large nucleoli and two mitotic figures. **Fig. 2.**—Cluster of carcinoma cells in sputum. Note the degenerating cells and nuclear characteristics with single or multiple nucleoli. **Fig. 3.**—Degenerating carcinoma cells in sputum. In one a preserved, atypical nucleus remains. In the others the nuclei are blurred and disintegrating. Note the cell size as compared to that of adjacent leucocytes. **Fig. 4.**—Several partially degenerated carcinoma cells in sputum. Note the two nucleoli in one preserved nucleus.

we also may incorrectly make a positive diagnosis, but to date this latter event has been infrequent. We have, as yet, not identified the oat-cell type in sputum and such cells would probably be exceedingly difficult to recognize, although the English writers record their demonstration in many cases.

DISCUSSION

In the period reviewed there have been 33 cases in which a pathologically proved or reasonably certain clinical and radiological diagnosis of bronchogenic carcinoma has been made. In 24 or 72.7% of these cases tumour cells were found in the sputum on one or more occasions. In two additional cases a false positive diagnosis of carcinoma cells was made in two of five specimens of sputum examined. As previously noted these false positive diagnoses were based on the finding of pseudo-keratinized epithelial cells without the presence of more typically malignant tumour cells. As a result of this experience the same error will not be repeated.

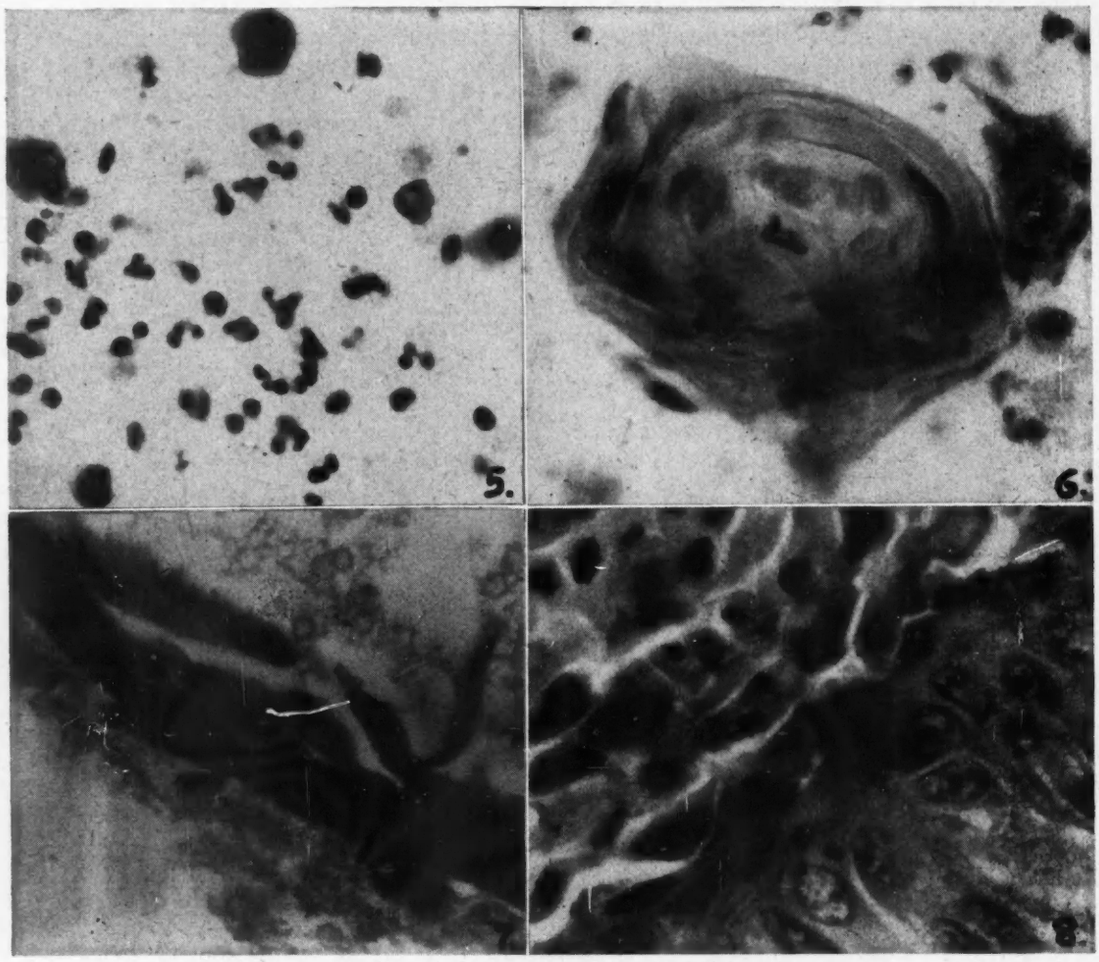

Fig. 5.—Scattered, single carcinoma cells in sputum, for comparison with the intermingled cellular exudate. **Fig. 6.**—A well-formed epithelial pearl present in the sputum of a case of well differentiated epidermoid carcinoma of a bronchus. **Fig. 7.**—A plaque of flattened, superficial squamous epithelial cells, non-malignant in histological characters but known to desquamate from bronchogenic carcinoma and to appear in the sputum. **Fig. 8.**—A section of the surface of a bronchogenic carcinoma. At lower right is solid carcinoma, well differentiated and with distinct "prickle cells". At upper left is mass of desquamating cells, similar in character to those seen in the sputum in Fig. 7.

As to the results achieved with this method of examination, during the period under review, there were:

Number of specimens examined	252
Number of patients	88
Number of positive diagnoses	47
Number of probable or questionable positive diagnoses	18
Number of negative diagnoses	187

TABLE I.

ANALYSIS OF CASES WITH POSITIVE SPUTUM

Case	*Specimens examined*	*Positive*	*Probable or questionable positive*	*Negative*	*Diagnosis confirmed*	*Diagnosis denied*	*Remarks*
1	18	4	3	11	Lung resection		
2	2	0	1	1			Clinical diagnosis only. Refused operation.
3	2	1	0	1	Inoperable at thoracotomy		
4	7	1	1	5	Autopsy		
5	2	0	1	1		Autopsy	
6	7	5	0	2			Clinical diagnosis only. Died at home.
7	1	0	1	0	Bronchial biopsy and autopsy		
8	2	1	1	0			Clinical diagnosis only. Refused operation.
9	2	1	0	1			Clinical diagnosis only.
10	4	2	0	2	Inoperable		
11	15	5	0	10			Clinical diagnosis only. Refused operation.
12	5	0	1	4	Autopsy		Pleural fluid positive. Sputum poor.
13	2	2	0	0	Bronchial biopsy		
14	8	1	2	5			Clinical diagnosis only. Died at home.
15	3	3	0	0	Bronchial biopsy and lung resect.		
16	3	1	1	1			Clinical diagnosis only.
17	8	5	0	3	Lung resection		
18	2	0	1	1			Clinical diagnosis only. Refused operation.
19	4	3	1	0	Inoperable at thoracotomy		
20	3	0	3	0			Clinical diagnosis only. Refused operation.
21	1	1	0	0	Cervical lymph node biopsy		Died at home.
22	2	1	1	0	Autopsy		
23	3	3	0	0	Autopsy		
24	4	4	0	0	Autopsy		
25	3	2	0	1	Autopsy		Pleural fluid positive.
26	3	1	0	2		Autopsy	
26	116	47	18	51	15	2	9

TABLE II.

ANALYSIS OF CASES WITH NEGATIVE SPUTUM AND DIAGNOSED AS HAVING BRONCHOGENIC CARCINOMA

Case	*Sputum specimens negative*	*Clinical diagnosis confirmed by*	*Remarks*
1	1	Biopsy	
2	4	Resection of lung.	
3	2	Autopsy.	
4	2	Autopsy.	
5	2		Clinical diagnosis only. ? neoplasm. ? Hodgkin's disease. Good response to x-ray therapy.
6	4		Bronchial biopsy showed inflammatory tissue. Thoracotomy—lung inoperable, probably neoplastic but possibly inflammatory.
7	3	Biopsy and lung resection.	
8	3	Autopsy.	Peripheral carcinoma of lung, mainly pleural. Pleural fluid positive.
9	1	Autopsy.	
9	22	7	2

Of the 24 cases in which such a positive sputum diagnosis was made, 15 have been confirmed pathologically at autopsy, by surgical resection of the lung or by biopsy. The remaining 9 cases have had a reasonably certain clinical and radiological diagnosis of bronchogenic carcinoma made. Five of these refused operation and were discharged and the remainder presumably were deemed inoperable. Two of this group are known to have since died outside hospital.

Of the 9 cases in which a clinical or confirmed diagnosis of bronchogenic carcinoma was made and in which the sputum was not demonstrated to contain tumour cells, 7 have been confirmed pathologically by biopsy, surgical resection of the lung or at autopsy. In one of these pleural fluid was found to contain carcinoma cells antemortem and at autopsy there was a massive involvement of the pleura by carcinoma with only a small peripheral carcinoma of the lung making the possibility of a positive sputum much less likely.

On the basis of these results it is felt that the examination of sputum for tumour cells is a worthwhile aid in the diagnosis of bronchogenic carcinoma, particularly in the large number of cases in which bronchoscopic visualization and biopsy of the tumour is not possible. It frequently is possible to confirm a clinical diagnosis in a day or two. It often is necessary to examine multiple specimens of the sputum for tumour cells in suspected cases, and when this is done a positive result is achieved in a significant proportion of the cases, some still at an operable stage. In the group with a positive sputum diagnosis, three cases underwent a successful surgical resection. Five cases refused operation and their operability is not known.

We are unable to express an opinion as to how early in the course of the disease this examination may be positive, but we have demonstrated in sections of bronchial tumours that identifiable carcinoma cells are shed from surfaces that are as yet not ulcerated. In our experience tumour cells are much more frequently demonstrated in the expectorated sputum than in the bronchial secretions aspirated at the time of bronchoscopic examination, contrary to the findings of Herbut and Clerf.[7, 8] It must be stated however that the number of bronchial aspirations examined by us is small.

SUMMARY

The method used and the results achieved in the examination of sputum for tumour cells in suspected cases of bronchogenic carcinoma in a two-year period are reviewed. A positive diagnosis was made in 24 or 72.7% of 33 cases, either proved or reasonably certain of having a bronchogenic carcinoma. A false positive diagnosis was made once in each of two cases. There were 9 cases in which the sputum was not demonstrated to contain tumour cells, 7 of these being proved by autopsy, biopsy or operation, and 2 cases having a probable clinical and radiological diagnosis of bronchogenic carcinoma.

REFERENCES

1. DUDGEON, L. S. AND WRIGLEY, C. H.: *J. Laryngol. Otol.*, **50**: 752, 1935.
2. *Idem*: *St. Thomas's Hosp. Rep.*, **25**: 1, 1936.
3. BARRETT, N. R.: *J. Thoracic Surg.*, **8**: 169, 1938.
4. BAMFORTH, J.: *Thorax*, **1**: 118, 1946.
5. GOWAR, F. J. S.: *Brit. J. Surg.*, **30**: 193, 1943.
6. WANDALL, H. H.: *Acta Path. et Microbiol. Scandinav.*, **20**: 485, 1943.
7. HERBUT, P. A. AND CLERF, L. H.: *J. Am. M. A.*, **130**: 1006, 1946.
8. CLERF, L. H. AND HERBUT, P. A.: *Ann. Otol., Rhin. & Laryng.*, **55**: 646, 1946.
9. PAPANICOLAOU, G. N.: *J. Am. M. Ass.*, **131**: 372, 1946.
10. WOOLNER, L. B. AND MCDONALD, J. R.: *Proc. Staff Meet. Mayo Clin.*, **22**: 369, 1947.

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INTESTINAL OBSTRUCTION*

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INTESTINAL obstruction has always been a serious disease, requiring expert care in its diagnosis and treatment. Although there has been a marked improvement in the results during recent years, the mortality rate is still extremely high in spite of good therapy from the standpoint of present knowledge.

Any consideration of intestinal obstruction must emphasize the fact that there are two types of obstruction, namely, (1) mechanical, and (2) functional. The most common type of functional ileus is that encountered following a laparotomy. It is, of course, extremely common following major operations in the peritoneal cavity, but fortunately rarely requires radical treatment.

Although figures from various authors vary considerably regarding incidence, strangulated hernia is classified as the most common cause of intestinal obstruction by almost all authors on the subject. Table I illustrates the incidence

TABLE I.

INCIDENCE OF TYPES OF OBSTRUCTION (SUMMARIZED FROM THE LITERATURE)

	%
Strangulated external hernia	38
Obstruction due to adhesions (¾ are postop.)	29
Obstruction due to neoplasm	13
Intussusception	8
Volvulus	3
Internal hernia	2
Foreign body (gall stones, etc.)	1
Miscellaneous causes (Cong. anom., mes. thromb., etc.)	6

of the various types of obstruction, representing a survey of several reports from the literature.

PATHOLOGY AND ABNORMAL PHYSIOLOGY

Although it is agreed that the profuse vomiting produced by intestinal obstruction results in dehydration and loss of electrolytes with serious effects on the patient, there are other possible ill effects which are controversial. The various pathologic manifestations observed in intestinal obstruction are so different in high obstruction from those in low obstruction that they will be considered separately.

High obstruction.—When the obstruction is located in the upper part of the small intestine vomiting is invariably present, and is usually severe, particularly when the obstruction is acute. When the obstruction is located at the pylorus, the loss of chlorides may induce alkalosis. On the contrary when it is located low in the jejunum or in the upper ileum the loss of base may result in acidosis. In any event, the vomiting will result in dehydration with decrease in urinary output. Dehydration obviously results in a diminished blood volume which is accentuated by the loss of plasma into the wall of the intestine and into the free peritoneal cavity. The decreased urinary output will result in an elevation of non-protein nitrogen. Fever may be present if there is a severe degree of dehydration.

Distension of the intestine results in obstruction of the veins, thereby producing loss of plasma and blood (particularly the former) into the intestinal wall and lumen of the intestine, (Wangensteen[1]). If the distension is severe and persists, it may actually result in gangrene, although gangrene is usually caused by compression of the artery and vein by a hernial ring, or other mechanical process. When the mechanical obstruction obstructs the vein the resultant accumulation of fluid in the intestine tends to increase the venous obstruction which may actually result in complete obstruction of arterial flow with consequent gangrene. Experimental studies by Sperling[2] indicate that gangrene can be produced if a pressure of 20 cm. of water is maintained in the lumen of the intestine over a period of 24 hours. The small intestine is particularly prone toward development of gangrene because the blood vessels enter between the muscularis and mucosal layers in contrast to the colon where the blood vessels enter outside the muscularis.

Fluid may develop in the peritoneal cavity early in obstruction. This fluid has a high protein content and in fact is similar to plasma. When the vascular obstruction progresses to the point that the artery is being obstructed, the fluid becomes bloody, indicating necrosis and gangrene. However, this fluid almost invariably remains sterile until perforation occurs.

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The loss of fluid in intestinal obstruction may be as great as 5 or 6% of the body weight. Under such circumstances severe tachycardia is usually present. Shock is apt to develop at any time. At this stage of the process, the permeability of the capillaries seems to be disturbed, insofar as fluids from the vascular tree may be lost into the tissues, thereby decreasing still further the circulating blood volume.

Low obstruction.—Since vomiting is not a very significant manifestation of low obstruction, dehydration from that source will not be prominent, but the anorexia induced by obstruction results in a markedly decreased intake of fluid, which consequently produces dehydration. The loss of electrolytes will, however, not be as pronounced in high obstruction, although dehydration may progress to a severe degree after several days of obstruction. However, considerable fluid including plasma is found in the lumen of the bowel, as is also noted in high obstruction. The pulse rate is increased less than in high obstruction. Shock is rarely encountered, except after perforation.

Distension is perhaps the most serious manifestation or pathologic factor encountered in low obstruction. In fact, distension may progress to the point that perforation occurs. This danger is so acute that it becomes a very important factor in determination of treatment as will be discussed later in detail.

DIAGNOSIS

It is not sufficiently appreciated that the type of pain in intestinal obstruction is quite diagnostic. Before strangulation develops, the pain is cramp-like in character, severe enough to disable the patient, but rarely severe enough to demand narcosis. This intermittent pain may disappear completely for a few minutes, although usually a moderate amount of diffuse residual pain remains following onset of the pain. Nausea and vomiting develop if the obstruction is high, *i.e.*, above the ileocæcal valve. Distension will develop rapidly except when the obstruction is in the duodenum or jejunum. Constipation is a rule, although it is easily possible to have a bowel movement after the development of complete obstruction since the bowel may be evacuated distal to the point of obstruction. Examination reveals distension; intestinal pattern and peristaltic waves are usually visible, unless the patient's abdominal wall is obese. The abdominal wall is tense but muscle spasm is absent unless a strangulated loop is present. In the presence of strangulation, the pain becomes much more severe and constant; tachycardia is more pronounced and the patient's facies becomes much more pinched and drawn, indicative of serious illness.

One of the most vital indices of the presence of intestinal obstruction is increase in peristaltic sounds. For this reason the physician must be well acquainted with the sounds of the normal abdomen.

Differentiation between mechanical obstruction and postoperative ileus may at times be extremely difficult. However, as a rule the absence of peristaltic sounds and peristaltic waves points strongly towards the presence of ileus, particularly if the patient has been operated upon within the past few days. Since obstruction may be caused postoperatively by a loop intestine becoming adherent at various points in the peritoneal cavity, the surgeon should nevertheless always be aware of the possibility of the presence of a mechanical obstruction when vomiting and distension develop at any time following a celiotomy. However, as pointed out later, almost all of these patients with obstruction due to adhesions following operation can be corrected by decompression and conservative treatment; this is particularly true when the obstruction develops within a few days following operation.

When the diagnosis is uncertain although distension, constipation and other manifestations of intestinal obstruction exist, it is permissible and usually advisable to give the patient an enema. If an effectual enema is obtained with relief of distension and other complaints the diagnosis of obstruction can usually be excluded, although reference has already been made to the possibility of having one bowel movement or effectual enema after development of the obstruction. However, it is usually very unwise to give the patient successive enemas because such therapy is usually very fatiguing and actually damaging to the patient, particularly if an obstruction is present.

It should be emphasized that barium should not be given by mouth for diagnostic purposes. There is an exception insofar as a small amount of thin barium may be given when the obstruction (if present) is located at the pylorus or

immediately distal to this point; under such circumstances the barium may be removed with a stomach tube (after completion of the x-ray examination) if an obstruction is present. Otherwise the barium may impact behind the point of obstruction and severely complicate the problem of therapy. A plain x-ray film of the abdomen may be of considerable aid, as is illustrated in Figs. 1 and 2.

As remarked previously, vomiting is usually present as an early and fairly constant symptom of high intestinal obstruction. However, when the obstruction develops gradually in the pylorus or duodenum, as in a stenosing ulcer, vomiting may be relatively infrequent, largely because the patient automatically cuts down on his fluid and food intake.

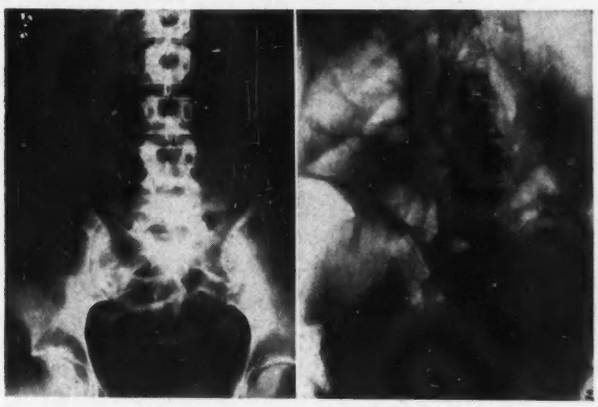

Fig. 1.—Plain x-ray film of patient having a Richter's femoral hernia with symptoms of 24 hours' duration. A small knuckle of mid ileum was incarcerated in the hernia. The distended loops of small intestine are plainly visible. **Fig. 2.**—Plain x-ray film of patient with obstruction of the descending colon of 4 days' duration. The abdomen is "filled" with distended loop of colon.

TREATMENT

Treatment of intestinal obstruction obviously varies depending upon the type of obstruction. Experience, as far as decompression is concerned, has shown that obstruction produced by adhesions can be completely relieved in at least 90% of cases, particularly if intelligent use of Wangensteen's technique is utilized. Decompression is likewise effective in functional ileus. In other types of obstruction, decompression is indicated, but plans must be made for operative interference as soon as the condition of the patient will permit. Therefore, it is obvious that treatment should be divided into two types, namely, non-operative and operative.

Decompression (conservative) therapy. — When the diagnosis of intestinal obstruction is made, gastrointestinal decompression and the administration of intravenous fluids should be started immediately. If the patient has eaten within the past several hours and has not vomited a great deal, it is usually desirable to evacuate the stomach with a large stomach tube and insert a Levine tube after all food particles have been removed. This procedure will remove all large food particles and thereby obviate the obstruction of the smaller nasal tube which is so apt to occur, and which is so serious from the standpoint of effect on the

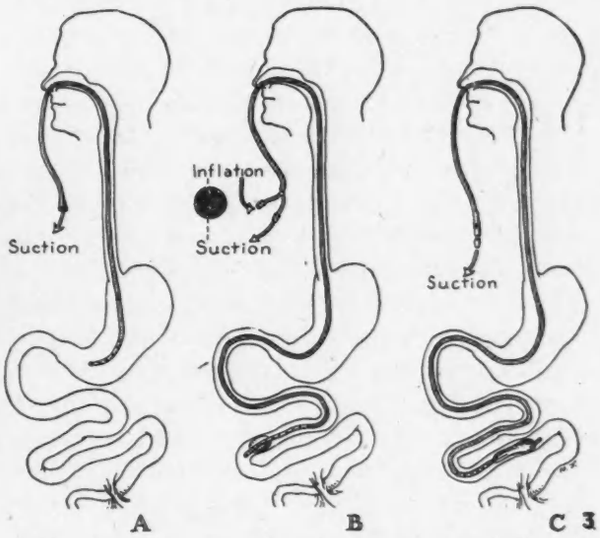

Fig. 3.—Three types of tubes are available for gastro-intestinal decompression: (A) Ordinary Levine tube inserted through the nose into the stomach. (B) The Miller-Abbott tube can be passed through the duodenum down to the point of obstruction. The tube contains 2 lumina as indicated by the insert. The balloon at the tip contains air. (C) The Harris tube can be passed down to the point of obstruction; it has an advantage over the Miller-Abbott tube because it has a large (only one) lumen for evacuation of fluid and food particles. The rubber balloon at the tip contains mercury.

patient. The amount of fluid removed at the time of evacuation of the stomach should be measured, since the volume is of considerable value in confirmation of the diagnosis of obstruction. Even though strangulation is present, decompression is indicated, and necessary to decompress the upper gastrointestinal tract, thus allowing a much smoother anæsthetic.

If observation and examination establish the diagnosis of obstruction by adhesions, it is usually safe to continue decompression therapy for many hours with the hope that the point of obstruction will be released. Under such circumstances, we expect certain effects from

the decompression. In the first place, there should be a decrease in distension. Almost invariably there is a decrease or complete cessation of pain. The amount of fluid obtained will be large, varying between 500 and 2,000 c.c. within the first 2 to 3 hours of decompression. Plain x-ray plates may be of value in determining the progress of decompression; for example, if an x-ray plate taken after evacuation of the stomach reveals no gas in the colon and gas is found in the colon after several hours of decompression, it may be assumed that the obstruction is no longer complete. Better confirmation of relief of obstruction is passage of gas, an effectual enema or a spontaneous stool.

It is very essential during decompression therapy that the physician watch the patient very closely for signs of strangulation, since operation is indicated immediately if strangulation develops, particularly if the patient's condition will tolerate an operation. It is frequently difficult to tell whether or not strangulation is present when the patient is first admitted, particularly if he is complaining of considerable pain or exhibits tachycardia and other evidence of a pre-shock state, because many of these manifestations of strangulation are similar to manifestations of acute dehydration and severe loss of electrolytes. However, if it can be demonstrated that strangulation is not present when the patient is admitted, its development can be detected with a fair degree of accuracy if the patient is watched carefully for certain manifestations discussed below and enumerated in Table II.

TABLE II.

CONTRAINDICATION FOR CONTINUATION OF NASAL SUCTION IN INTESTINAL OBSTRUCTION

1. Increase in abdominal pain.
2. Increase in pulse rate.
3. Increase in abdominal tenderness.
4. Development of muscle spasm.
5. Failure to obtain relief of distension.
6. Development of a mass.
7. Fever.
8. Leukocytosis.
9. Sudden fall in blood pressure.

Manifestations of strangulation.—The manifestations listed below may be considered contraindications to continuation of intestinal decompression, because they are, in reality, manifestations of strangulation.

1. Persistence of or *increase in the amount of pain* is usually indicative of the development of strangulation. Persistence of pain might be expected if adequate decompression cannot be achieved, but in the presence of strangulation, pain will be prominent even though decompression has been achieved.

2. An *increase in pulse rate* is an important index of the development of strangulation. It may be caused by the loss of blood into the involved loop, but would likewise be expected because of absorption of toxic products from the strangulated loop. However, one must be certain that extraneous causes of tachycardia, including apprehension, anxiety, etc., are eliminated.

3. An *increase in abdominal tenderness* should make the physician suspicious of the development of a strangulated area.

4. *Development of muscle spasm* anywhere in the abdomen is indicative of the presence of peritonitis or a lesion likely to result in peritonitis. Muscle spasm may be produced by a strangulated loop or by a perforation at a point compressed by a very narrow band of adhesions.

5. *Failure to obtain relief of distension* is usually caused by improper decompression, including stoppage of the tube or inadequate care. However, if it can be proved that the distension is not caused by stoppage of the tube, the possibility of development of a strangulated loop should be considered, although distension is by no means pathognomonic of the development of strangulation. Persistence of distension may simply be an indication that the obstruction is low down and the gas is not being removed by the decompression tube.

6. The *development of a mass* is fairly strong indication of the presence of a strangulated loop, although the mass would obviously not develop if obstruction is produced by a narrow band. When an entire loop of intestine is caught by an adhesive band or other mechanical factor, as in a volvulus, this loop can be palpated as a mass if it becomes strangulated or markedly distended.

7. *Fever* is a strong indication of the presence of strangulation or perforation if dehydration or other complicating causes can be eliminated as a possible explanation. If the fever is produced by the intra-abdominal lesion, local findings including tenderness, mass, etc., will almost always be present.

8. *Leukocytosis* is usually encountered in strangulation or peritonitis secondary to perforation. Rarely is the white count above 11,000 to 12,000 if the obstruction is a simple one such as that produced by adhesions.

9. A *sudden fall in blood pressure,* with development of other manifestations of shock almost always develops when a strangulated loop perforates into the free peritoneal cavity. Obviously, the physician must consider other possible explanations (*e.g.,* hæmorrhage), or the shock or pre-shock state; if the patient is being treated for intestinal obstruction in the absence of any fresh operative wound, perforation would be a much more plausible explanation than hæmorrhage. Obviously, perforation demands immediate operation. Perforation of the cæcum will occur, not infrequently, in patients with complete obstruction of the left colon, if operative decompression (colostomy) is not performed early. This possible complication will be discussed in more detail later.

It must be emphasized that a physician must not wait for the development of all of the above manifestations before arriving at the diagnosis of strangulation, or resorting to operative therapy. In general the increase or persistence of pain along with the development of tachycardia will be the earliest manifestations and usually will be sufficient to justify discontinuance of conservative treatment and the adoption of operative therapy.

OPERATIVE TREATMENT

In certain types of lesions, including intussusception, volvulus, etc., operative treatment is indicated as soon as the patient's condition will tolerate it. As indicated previously, the upper gastro-intestinal tract should be evacuated upon admission of the patient, regardless of the type of obstruction. This evacuation will be necessary even though a strangulation was diagnosed upon admission. However, if the obstruction has been present for 24 hours or longer, dehydration and loss of electrolytes may have progressed to the point that the patient's condition will not tolerate an immediate operation. It must be remembered that it would take several hours to correct completely the dehydration and the electrolytic imbalance; therefore, it is necessary that the physician choose a time when he thinks dehydration and electrolytic imbalance have been corrected sufficiently to allow celiotomy without endangering the patient's life. Too much delay while awaiting correction of the abnormal states mentioned above, may actually allow perforation to develop. Sufficient fluid and electrolytes can usually be injected intravenously in 2 or 3 hours to justify operation after that length of time, particularly if the fluid has been given rapidly and 2 or 3 pints of blood are available for transfusion.

Another strong indication for operation in intestinal obstruction is the presence of a complete obstruction in the colon regardless of the type. This strong indication is dependent upon the fact that it is very difficult or almost impossible to decompress across the ileocæcal valve unless a Miller-Abbott, or Harris tube is used. However, even if these tubes are used, passage through the entire small intestine into the colon is not advocated because of complications such as inability to withdraw them. The primary indication for early operation in obstruction of the large bowel lies in the possibility of perforation of the cæcum incident to the distension which cannot be corrected. When the operation is performed for obstruction of the colon, any direct attack on the lesion itself is rarely justifiable. The surgeon should be content with relieving the obstruction by colostomy. The author prefers a short transverse incision in the right upper quadrant, bringing a loop of the right transverse colon out, rather than performing a tube colostomy which would allow the fæcal stream to proceed on past the colostomy opening. It is usually undesirable to make the incision large enough for exploration, assuming that the diagnosis of obstruction is fairly well established.

If the obstruction is due to a solitary adhesion, release can be achieved readily by simple section of the adhesion. On rare occasions these are so dense that separation may be impossible without leaving large raw areas which would result in reformation of adhesions. Under such circumstances, it may be desirable to perform an anastomosis short-circuiting the fæcal stream around the involved areas.

If at all possible, resection should be avoided, since resection in the presence of intestinal obstruction is followed by a very high mortality rate. However, it is obvious that gangrenous bowel must not be left in the abdomen. In general, the appearance of the bowel may be sufficient to determine the necessity for resection. If the bowel is cyanotic and has lost its glistening appearance, particularly when warm wet packs have been applied for a few minutes after release of an obstructive band,

it can be assumed that the bowel is not viable and resection will be necessary. Ordinarily it is desirable to do a resection followed by anastomosis, thus eliminating ileostomy. However, on rare occasions the patient may be so critically ill that he will not tolerate additional operative work required for suture of the bowel. Under such circumstances, the involved intestine is brought out of the wound and removed after the Mikulicz technique. This procedure is readily tolerated when the involved area is large bowel, but if the ileostomy is created in the jejunum or upper ileum, so much fluid, food and electrolytes may be lost that the patient's recovery may be jeopardized.

Ordinarily it will not be necessary to open the intestine and evacuate the gas, particularly if decompression has been initiated since the patient's admission to the hospital. Opening the intestine to evacuate gas from the intestinal content adds greatly to the risk of the operation. However, if resection has been done, it is very simple to insert a catheter through the opening just before the last suture is tied. By this procedure a catheter can be threaded up into the distended loop with evacuation of the gas and fluid.

During the operation it will usually be necessary to give large quantities of blood, particularly since dehydration may still be present and considerable blood or plasma may have been lost through the wall and lumen of the intestine.

POSTOPERATIVE TREATMENT

Gastro-intestinal decompression must be instituted after operation. If it is possible to relieve the obstruction without resection of the intestine, restoration of peristaltic mechanism and intestinal function is to be expected within 48 to 72 hours. Passage of gas will afford assurance that the obstruction has been relieved and motility has resumed. By this time it is safe to start the patient on significant quantities of soft food by mouth. When intestinal anastomosis has been performed, decompression may be necessary for a longer time than when the obstruction was relieved by the severance of a band. However, even under these circumstances the tube may be removed in 72 hours and liquid diet begun. A fairly accurate estimation as to relief of the obstruction can be obtained by measuring the amount of gastric residue after the tube has been clamped for 6 to 8 hours; for example, if the tube has been clamped overnight and the gastric residue is 150 c.c. or less, it is a fairly good indication that no obstruction is present and oral feedings can be resumed.

RESULTS

Before the advent of gastro-intestinal decompression by Wangensteen, the over-all mortality rate in intestinal obstruction was between 30 and 40%, depending largely upon the number of strangulations present in the series. During recent years, mortality rates of 10 to 15% have been reported by most clinics. For example, in a series of 98 cases, Bodenheimer and associates[3] report a mortality rate of 14.6%. The increase in mortality rate following resection is illustrated by a rate of 27.8%, reported by Dennis and Brown[4] in 18 patients having resection of a gangrenous loop. The duration of the obstruction is likewise an important factor in the mortality rate. If the patient is seen within 24 hours following onset of symptoms, the mortality rate will be very low. A summary of several reports in the literature reveals a rate of less than 5% in this group.

In general, improvement in mortality rate in intestinal obstruction is dependent upon (1) intelligent use of gastro-intestinal decompression; (2) early diagnosis; and (3) careful attention to imbalances related to fluid, electrolytes and blood protein. Obviously, other factors such as operative technique and the relative incidence of patients with strangulation in the series, will be important accessory factors.

REFERENCES

1. WANGENSTEEN, O. H.: Intestinal Obstruction, a Physiological and Clinical Consideration, 2nd ed., Charles C. Thomas, Springfield, Ill., 1942.
2. SPERLING, L.: *Arch. Surg.*, **36**: 778, 1938.
3. BODENHEIMER, M., CASTEN, D. AND FRIED, J. J.: *J. Internat. Coll. Surg.*, **10**: 174, 1947.
4. DENNIS, C. AND BROWN, S. P.: *Surgery*, **13**: 94, 1943.

RÉSUMÉ

Rappel physiopathologique rapide de l'obstruction haute et basse. Le diagnostic est aidé par le caractère crampoide de la douleur, par les vomissements dans les obstructions hautes, par la distension, par la constipation, par la perception du péristaltisme à travers la paroi. Dans l'étranglement, le tableau se rapproche de celui du choc. La radiographie simple peut parfois aider le diagnostic d'obstruction. Le traitement sera médical et le malade pourra être décomprimé par succion s'il n'existe pas de signes d'étranglement. Par contre, si la douleur abdominale augmente, si le pouls s'accélère, si la paroi durcit et si la distension ne cède pas, s'il survient une masse palpable en même temps que de la fièvre, de l'hyperleucocytose et une chute brusque de la t.a. il faudra opérer. Les modalités de la thérapeutique chirurgicale sont décrites. Les résultats sont d'autant meilleurs que la diagnostic est plus précoce et que le malade est mieux étudié au sujet de l'équilibre des liquides, des électrolytes et des protéines du sang. JEAN SAUCIER

DIAGNOSIS OF CONGENITAL HEART DISEASE*

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A CLINICAL study of congenital heart disease is closely linked to its pathology. The basis of the clinical diagnosis is therefore found at the postmortem table, where the murmur, x-rays, etc., can be compared with the actual lesion. With this in mind, 144 postmortems at the Hospital for Sick Children, Toronto, were reviewed and when possible the x-rays and murmurs were related to the autopsy findings. At the same time, the cases seen in the Cardiac Clinic with congenital heart disease were reviewed and the clinical diagnosis set down as shown in Table I.

The most common defect found was an anomaly of the ventricular septum. It was found 88 times in all but only 13 times as an isolated defect. In the Cardiac Clinic this type of abnormality was by far the most common. It occurred in 48 instances.

Interventricular defect.—The diagnosis of a patent interventricular septum as an isolated defect is usually not difficult during life: (1) There is a loud harsh systolic murmur heard best in the 4th left interspace close to the sternum. It is widely transmitted as a rule, often up to the 1st rib and over to the axilla but the point of maximum intensity is easily determined. (2) The patient is well and active as a rule. (3) The heart is frequently not much enlarged. (4) The x-ray may show some fullness in the region of the pulmonary area and artery, with increased hilar shadows, all of which is due to the increased pulmonary flow. The x-rays of four such cases are shown in Fig. 1. One can see variations in shape and some show increased prominence of the pulmonary artery and heavy hilar vessel markings. If the opening in the septum is small activity is not interfered with but when it is large, failure may occur with death. When the patent septum is associated with a variety of other defects the diagnosis becomes more difficult. Such cases will be referred to again.

Interauricular defects.—Interauricular defects are also common at postmortem: 77 cases showed an opening between the auricles. Many of them were in young infants and were physiological rather than pathological. It was noted as an isolated defect in only 4 out of 77 cases. It is not commonly diagnosed in the Cardiac Clinic since only 5 cases were encountered. Maude Abbott found an interauricular septal anomaly as the primary defect in 77 cases out of 1,000. The clinical diagnosis is made chiefly by the shape of the heart by x-ray. An example is shown in Fig. 2. The right auricle is enlarged, the pulmonary conus dilated to a greater degree than is usually found in the patent septum. The hilar vessel shadows show engorgement and under the fluoroscope they usually pulsate considerably. A murmur may be found up the left border of the sternum, due to the dilated pulmonary artery. An accurate diagnosis is not easy because it is likely that the flow from the left auricle into the right auricle varies considerably with the position and activity of the patient. A catheterization of the heart is useful in diagnosis since it may permit the catheter to pass into the left auricle and also

TABLE I.

CHIEF CONGENITAL ANOMALIES OF THE HEART IN CHILDREN DISCOVERED AT POSTMORTEM OR IN THE CARDIAC CLINIC

Type of defect	*Chief individual anomalies—postmortem 1930-45, out of 144 cases*	*Chief anomaly found in postmortem*	*Chief anomaly diagnosed in Cardiac Clinic 1946*
1. Ventricular septal defects	88	13	48
2. Interauricular septal defects	77	4	5
3. Patent ductus arteriosus	49	3	15
4. Pulmonary stenosis and tetralogy of Fallot	14	11	11
5. Aortic stenosis	17	9	1
6. Coarctation of aorta	25	17	1
7. Transposition of great vessels	15	15	6
8. Tricuspid stenosis or atresia	12	9	4

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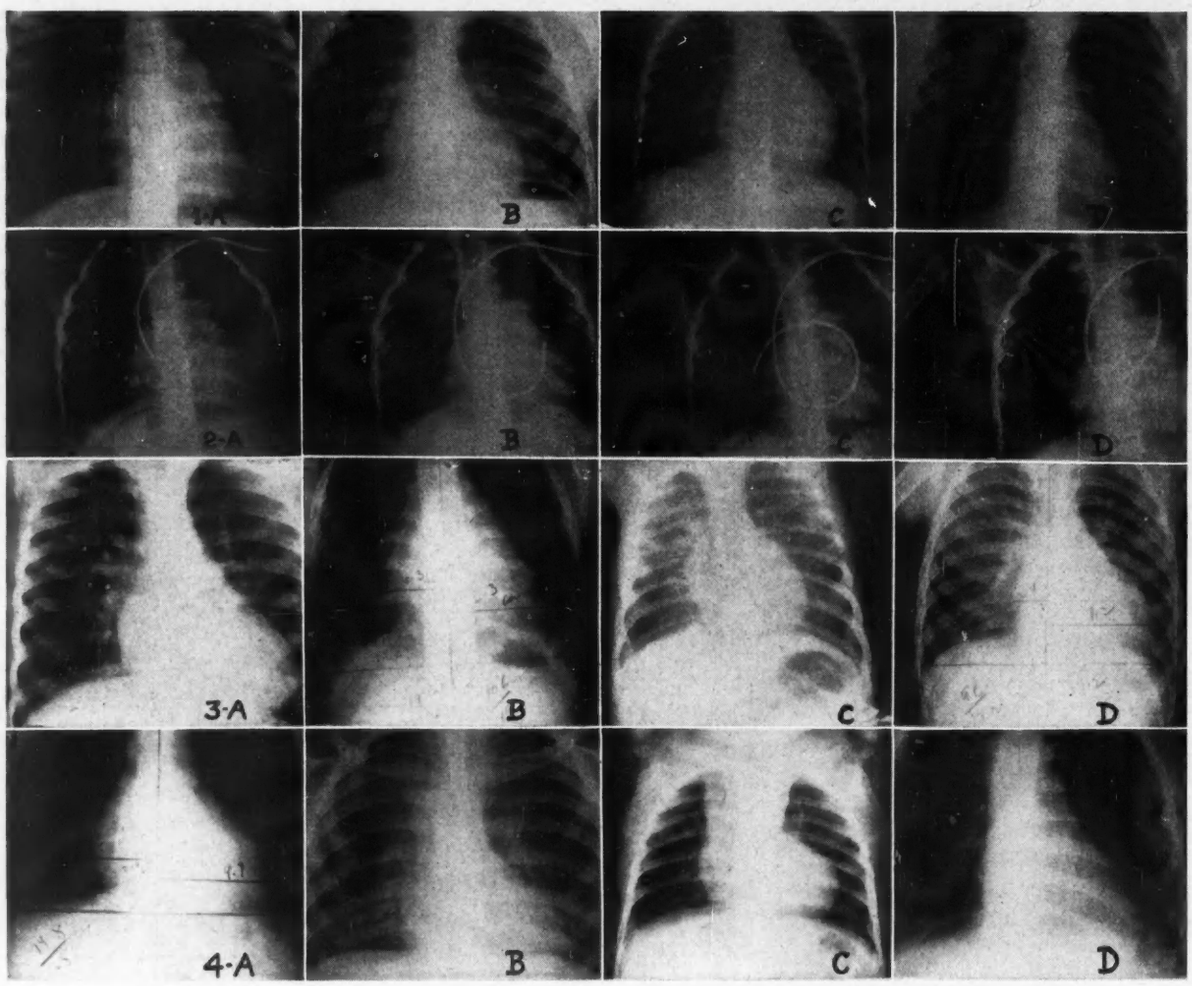

Fig. 1.—Four cases with murmurs typical of patent interventricular septum: (A) Shows a prominent left border in the region of the pulmonary arter. (B) Rounded blunt apex with no bulge in the region of pulmonary artery but increased hilar vessel markings which pulsated under the fluoroscope. (C) Enlarged heart with prominent left border and increased hilar markings. (D) Heart well within the limits of normal size. Hilar vessel shadows normal. **Fig. 2.**—Six-year old child with interauricular septal defect: (A) Catheter in superior vena cava. (B) Catheter in right auricle (2 vol. % higher 02 content than in superior vena cava). (C) In right ventricle. (D) In pulmonary artery. (E) Catheter passed through interauricular septal defect into left auricle and out into a pulmonary vein. **Fig. 3.**—Three cases of patent ductus—proved at operation: (A) Enlarged left ventricle and increased hilar markings which pulsated under the fluoroscope. (B) Slightly enlarged heart with slight prominence in region of pulmonary artery. (C) and (D) are the same patient, (C) at 6 weeks; (D) at 4½ years. The latter shows an enlarged left ventricle with increased hilar markings. **Fig. 4.**—Tetralogy of Fallot. (A) Some generalized enlargement. (B) Right aortic arch. (C) Marked concavity or angulation in region of the pulmonary artery. (D) Fairly normal heart shape.

may show an increase in oxygen content in the right auricle due to the left and right shunt that usually accompanies this defect.

A 6-year old girl who had a history of one mild attack of rheumatic fever showed clinical and x-ray findings suggestive of a patent interauricular septum. Her x-rays with the catheter in various positions are shown in Fig. 2 There was a moderate systolic murmur heard in the pulmonary area and down the left border of the sternum. The fluoroscope revealed some increased pulsation in the pulmonary vessels. With an intracardiac catheter it was possible to demonstrate an opening between the two auricles. The blood gas findings confirmed a left to right shunt in the auricles and are shown as follows:

TABLE II.

Blood sample	*Oxygen content*
Superior vena cava	11.7 vols. %
Right auricle	13.6 " "
Right ventricle	13.4 " "
Pulmonary artery	13.0 " "
Pulmonary vein	14.5 " "
Pulmonary blood flow	6727 c.c. per min.
Systemic blood flow	4228 " " "
Left to right shunt	2499 " " "

It is considered important to be able to make an accurate diagnosis of the interauricular defects since it is likely that an operation may be available which will permit surgical closure.

Patent ductus.—The diagnosis is made here by finding the typical murmur. This is heard with maximum intensity in the pulmonary area and transmitted out toward the shoulder. It is harsh and machinery-like, but its chief characteristic is the fact that it is continuous. In young infants, it may be only systolic in time and later on develop the continuous quality. The x-rays show a variation in cardiac shape (see Fig. 3), but usually the pulmonary artery is full, with evidence of engorgement in the hilar area. Under the fluoroscope the hilar vessels may be seen to pulsate as well as the pulmonary artery. Where there is a simple patency of the ductus the child is usually well and active, and of good colour. Occasionally this defect accompanies pulmonary stenosis and then the child may be cyanosed but is less so than he would be without the patent ductus.

When doubt exists as to the diagnosis, catheterization of the heart will permit an accurate estimate of the flow back into the ductus and pulmonary artery from the aorta. The following is an example:

TABLE III.

Blood sample	*Oxygen content*
Superior vena cava	14.3 vols. %
Right auricle	14.3 " "
Right ventricle.....Spec. No. 1	13.5 " "
" " 2	13.7 " "
Pulmonary artery.....Spec. No. 1	15.5 " "
" " 2	15.7 " "
Flow through lungs	8484 c.c. per min.
Flow through systemic circulation	5282 " " "
Shunt through ductus	3202 " " "

Coarctation of the aorta.—In making the diagnosis of this condition in children there is one important detail of examination, that is, palpating the femoral artery. It is invariably feeble or absent in coarctation of the aorta. The children with this condition who survive infancy usually look well and lead essentially normal lives. There is usually a systolic murmur down the left border of the sternum that is equally well heard in the back. The blood pressure is higher in the arm than the leg and the x-ray shows a slightly enlarged heart with an easily seen ascending aorta and absent aortic knob on the left side. The electrocardiogram usually shows left axis deviation. This defect was common in the infants that died in the first few days of life, 25 instances, whereas we have one active in the Cardiac Clinic at present. Since these cases can be operated on now, it is important that we make a search for them.

Cyanotic group.—From the literature and her own experience, Maude Abbott[1] collected data on 1,000 cases of congenital heart disease: 355 had a history of cyanosis before they reached the terminal stages of their lives. A summary of these cases shows that the chief defect of the heart noted was pulmonary stenosis or atresia. The second was transposition of the great vessels. The third, dextrocardia, and so on.

Since Taussig[2] has shown that the chief cause of cyanosis in congenital heart disease is an insufficient proportion of the blood passing through the lungs, it follows that the majority of cyanotic cases are candidates for the Blalock-Taussig operation. Diagnosis then is directed to determining the suitability of operation. The tetralogy of Fallot is the most suitable type of case and the diagnostic criteria are set down below. Transportation of the great vessels is not considered suitable for the Blalock-Taussig operation since there is no channel for the blood to get from the pulmonary circulation into the systemic. Eisenmenger's complex is not suitable since the pressure is often just as high in the pulmonary artery or the aorta. Persistent truncus arteriosus is unsuitable for the same reason. Pulmonary stenosis with no other defect would not be expected to benefit by operation since the cyanosis arises from the slow rate of flow. The differential diagnosis of these conditions is helped greatly by the use of angiocardiography or by catheterization of the heart. The commonest anomaly in cyanotic children is pulmonary stenosis. This is usually associated with dextra-position of the aorta and an interventricular defect, which with enlargement of the right ventricle make up the group that is called the tetralogy of Fallot.

The diagnosis of the tetralogy of Fallot depends on the following points:

1. The presence of cyanosis usually accompanied by clubbing of the fingers.
2. As a rule there is a rough harsh systolic murmur best heard in the 2nd and 3rd interspaces. The murmur may be absent when the stenosis is extreme or atresia is present.

3. The heart is usually not greatly enlarged, approximately 50% of chest diameter.

4. X-ray shows a raised apex giving a wooden-shoe or sheeps-nose appearance to the heart shadow. This is indicative of an enlarged right ventricle. Another sign in these cases is a concavity or a sharp angle in the region of the pulmonary artery. This is due to the low pressure in the pulmonary artery beyond the stenosis. Fig. 4 shows the varieties of contours found in the tetralogy of Fallot.

5. The fluoroscopic examination is perhaps the most useful. It confirms x-ray findings as to size and shape but it has a special function in estimating the degree of flow through the pulmonary arteries. In the normal individual, by close examination of the hilar regions especially on the right, one can usually make out distinct pulsation of the main branches of the pulmonary artery. These pulsations are absent in the tetralogy of Fallot as a rule and the hilar regions appear quiet. Furthermore, the hilar shadows are usually smaller and less clear than normally, since most of the shadow there is due to vessels. If many collaterals have dilated up to help supply the lung, more shadowing may show but this is lacy in appearance and more likely to occur in older patients. A clear pulmonary window and an enlarged aorta are frequently found. This technique has been developed by Dr. Helen Taussig in Baltimore and it is most useful since the Blalock-Taussig operation is designed to improve the flow to the lungs and thus any child with reduced flow is a potential candidate.

6. The electrocardiogram should show right axis deviation. The P. wave may be high and pointed. If the electrocardiogram is normal one should reconsider the diagnosis very seriously.

When left axis deviation is present in the electrocardiogram there is usually tricuspid atresia. Such cases frequently have pulmonary stenosis also and may be suitable for operation.

Recently Bing[3] and his associates at Johns Hopkins have presented data on the blood gases in the tetralogy of Fallot. By using the catheter technique of determining the blood flow through the lungs and comparing the result with the blood flow through the systemic circulation the degree of stenosis and the amount of shunt could be worked out. An example of such a case is shown in Table IV.

Bing points out that a good deal of blood reaches the lungs by collateral channels, especially in the older cases. Here the blood flow can only be determined by the indirect CO_2 method. By comparing these results with those obtained by the catheter the amount of flow through the collaterals may be arrived at

Bing[3] has also utilized an exercise test of Cournand[4] in these children. In a normal individual the oxygen consumption per litre ventilated rises with exercise. In the tetralogy of Fallot the oxygen consumption per litre ventilated falls unless there is a large enough collateral circulation to take care of the increased respiratory demand during exercise. Since Eisenmenger's syndrome is one of the chief diagnostic problems in relation to the tetralogy, the test has distinct value. The Eisenmenger complex is similar to the tetralogy of Fallot but no stenosis is present. As a result, the pressures in the right ventricle and pulmonary artery are very high. This produces a bulge in the pulmonary artery as it leaves the heart and good pulsations in the lung fields. This type is usually readily distinguished from the tetralogy cases by these signs. If there is

TABLE IV.

Blood samples	*Oxygen content*	*Capacity*	*% Saturation*
Superior vena cava	17.4 vols. %		
Right auricle	18.4 " "		
Right ventricle Spec. No. 1	20.4 " "		
" " 2	20.1 " "		
Femoral artery Spec. No. 1	22.5 " "		
" " 2	22.3 " "	28.4 vols. %	79.3
Systemic blood flow	4317 c.c. per min.	(3.4 L/Min/M²)	
Pulmonary artery flow	2650 " " "	(2.1 L/Min/M²)	
Right to left shunt	1667 " " "	(1.3 L/Min/M²)	

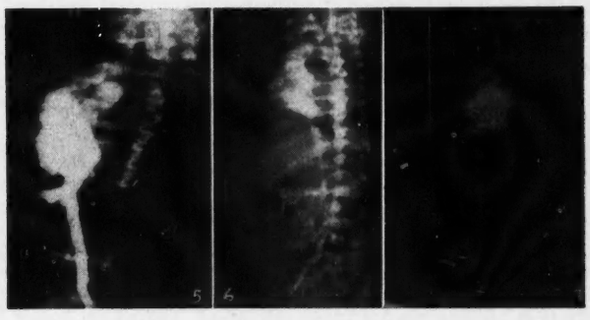

Fig. 5.—Interventricular septal defect with dextraposition of aorta. X-ray taken 1½ seconds after the beginning of injection of 10 c.c. of 50% diodrast. Aorta and pulmonary artery fill well from right ventricle. Pulmonary artery is a little larger than aorta. **Fig. 6.**—Tetralogy of Fallot. X-ray of three-weeks' old baby taken 1½ seconds after 9 c.c. of 35% diodrast had begun to enter the circulation. Aorta is seen to fill from the right ventricle and is seen to override the left ventricle also. No filling of the pulmonary artery can be seen. **Fig. 7.**—Tricuspid atresia. X-ray of three-weeks' old baby 2 second after beginning of injection of 10 c.c. of 35% diodrast. Left ventricle is seen to fill immediately and contrast medium passes on into aorta and also what must be a small opening into a hypoplastic pulmonary artery. Right ventricular area appears non-functioning.

still doubt, catheter studies will permit a more accurate diagnosis since it is frequently possible to get a catheter in to the pulmonary artery and thus accurately estimate flow. Perhaps even more useful than the catheterization is angiocardiography in differentiating Eisenmenger's complex from the tetralogy cases among infants.

In 1937, Castellanos[5] made the first attempt to diagnose types of congenital heart disease by angiocardiography. By this method 10 to 20 c.c. of diodrast are rapidly injected intravenously and x-rays taken immediately. This procedure offers very useful information. Perhaps its chief value is to demonstrate a shunt from the right ventricle into the aorta. The x-ray taken immediately can show this clearly. At the same time it can show whether or not the pulmonary artery is filling and to what degree. Since these are the two questions a surgeon needs to have answered before performing a Blalock-Taussig operation, the value of this method of investigation is obvious. Fig. 5 shows diodrast outlining the heart in a case of interventricular septal defect with dextraposition of aorta. One can readily see the aorta and pulmonary arteries which have both filled immediately, 1½ seconds after the beginning of the injection of diodrast in the leg vein.

Fig. 6 is the angiocardiography x-ray of a 3-weeks old baby with cyanosis. The diodrast has filled the right auricle, right ventricle, and has then passed into the aorta. The aorta has filled in a fashion that suggests overriding of both right and left ventricles. There is no evidence of a normal pulmonary artery. An exceedingly faint shadow suggests a small amount of blood may be getting through into the pulmonary arteries. A presumptive diagnosis of tetralogy of Fallot has been made.

Fig. 7 shows another angiogram of a case of non-functioning right ventricle, that is tricuspid atresia and pulmonary hypoplasia. The lack of filling of the right ventricle is shown, as is also the hypoplasia of the pulmonary, as revealed by the small circular shadow, much smaller than the aorta.

SUMMARY

The more common types of congenital heart disease in both the cyanotic and non-cyanotic groups have been discussed and the cardinal points in diagnosis outlined. The value of the intracardiac catheter and angiocardiography have been compared. Both are necessary diagnostic aids in certain cases where the pathology is not clarified by ordinary clinical means. Accurate diagnosis has become exceedingly important now that surgery offers hopeful treatment to many children.

REFERENCES

1. ABBOTT, M.: Atlas of Congenital Heart Disease. Published by the American Heart Association, 1936.
2. BLALOCK, A. AND TAUSSIG, H. B.: *J. Am. M. Ass.*, 128: 189, 1945.
3. BING, R. J., VANDAM, L. D. AND GRAY, F. D.: *Bull. Johns Hopkins, Hosp.*, 80: 121, 1947.
4. Discussion of the physiological classification and presentation of clinical tests in pulmonary insufficiency, *Am. Rev. Tuberc.*, 4: 183, 1945.
5. DE LOS REYES, R. P., CASTELLANOS, A. AND PERREIRAS, R.: *Am. Heart J.*, 25: 298, 1943.

TREATMENT OF THE MENOPAUSE

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THE purpose of this paper is to stress the psychosomatic approach to the treatment of the menopause. The majority of complaints of the menopause are connected basically with disturbances of the vegetative nervous system;[1] hot flushes, chills, dizzy spells, cold, moist or numb extremities, tachycardia, palpitation, dyspnœa, headaches, sweating and formication. Contributed to by the vegetative imbalance there are also disturbances of all the other body systems, which sometimes become the major source of trouble. Thus there may be severe emotional upsets, nervousness, depression, anxiety and irritability connected with the central nervous system; constipation, flatulence, loss of appetite connected with the gastro-intestinal system; generalized aches and pains connected with the osseous systems and a host of other disorders.[2] In practically all of these complaints the vegetative nervous system plays a major precipitating or aggravating rôle.

It is believed that the disturbance of the vegetative nervous system and all the above mentioned symptoms arises from a decrease in ovarian function. This produces an upset in the normal function of all the other glands of internal secretion, including the thyroid and pituitary;[3, 4] and this in turn results in increased strain on the autonomic nervous system primarily, and on all other body systems.

It is known that ovarian function is present to a minor degree before puberty, that it rises sharply at the time of the menarche, reaches a peak in the late twenties and then gradually

declines until at around forty-seven years the level of ovarian function falls so low that menstruation ceases. There is evidence that diminished ovarian function continues for many years after the climacterium.[5] It should be noted, however, that menstruation is not solely dependent on the level of œstrogenic output of the ovaries, since some women will not menstruate with a relatively high œstrogen level and others will continue to bleed regularly with an unusually low level.[6] In many women the symptoms of the menopause will arise while they are still getting their menstrual periods and while their œstrogen level is still comparatively high.[7] In others there are practically no symptoms even though ovarian function has ceased completely, as with bilateral oöphorectomy, or almost entirely ceased in the natural course of events.[8]

We may ask why certain women have menopausal symptoms when ovarian function declines only a little, and others have no symptoms even though ovarian function ceases completely. There is evidence to support the belief that this is due to variation in the stability of their vegetative nervous system and its ability to adjust to stress and strain. A woman who has a highly sensitive and unstable nervous system may develop menopausal symptoms very early, often before she stops menstruating, and indeed she often gets similar symptoms with the variations in endocrine balance that occur each month with menstruation. A woman who has a very stable vegetative nervous system can tolerate a complete decline of ovarian activity without having any symptoms.

In this connection it is interesting to note that women are likely to exhibit at the time of the menopause, symptoms associated with those systems which gave evidence of instability earlier in their lives. Thus a woman who tends to be gloomy and depressed at the time of her periods or when under strain will usually show similar symptoms at the time of the menopause. If she is jittery or irritable or has rheumatic complaints or headache or gastro-intestinal troubles, these particular symptoms will become more noticeable at the time of the climacterium. In other words, those systems which have given evidence of weakness earlier in life are most likely to give trouble under the strain of the glandular changes occurring at the menopause. In almost all cases, however, symptoms of vegetative nervous system imbalance predominate.

It is our contention that the rise and fall of ovarian function in women, as previously described, is a normal physiological process, and that treatment with œstrogens to unduly prolong or sustain a higher œstrogen level in the blood is an unnatural, artificial and at times a harmful or dangerous practice. It would seem much more logical to treat the imbalance of the oversensitive vegetative nervous system which is unable to withstand the stress of the change in ovarian activity, rather than to concentrate on treating the glandular system which is behaving normally and going through its regular phase of declining activity.

We object to the long continued use of œstrogens for the treatment of menopausal symptoms on the following grounds. It creates an unnatural and artificial substitution form of ovarian activity long after that activity should have normally ceased. As a result it does not permit the other body systems to adjust themselves to the low level of ovarian activity that should exist, and therefore the substitution treatment must be continued indefinitely in many cases.

It is treating a system which is behaving normally, and neglecting the vegetative nervous system and the other systems which are unbalanced and which by behaving abnormally are really responsible for the symptoms. It seldom cures the patient, since it acts only as substitution therapy and nothing is done to correct the underlying imbalance. All of us have seen patients who have required œstrogen therapy for ten years or longer and still have symptoms whenever the dosage is decreased. This is to be expected, inasmuch as the underlying hypersensitivity of the vegetative nervous system has not been corrected.

If we remember that ovarian function begins to decline in the late twenties, and symptoms generally arise at around forty-seven years, we will see that the decline has gone on for seventeen years. It is true that it may be more rapid towards the end, but it does seem rather futile to contend that by giving œstrogens for a few months or a year we are going to alter appreciably the rate of decline which has been going on for seventeen years. What we are really doing is keeping the level of ovarian hormone above the point at which vegetative instability will manifest itself in that particular patient and no matter when we stop the treatment, the patient will have symptoms unless in

the meantime her nervous system has become more stable because of other factors.

There is no complete agreement among authorities as to the risk of hormones being carcinogenic,[9, 10, 11] but most of them admit that they should not be given to patients when there is a family history of breast or genital cancer and certainly not to a patient who has herself been treated for such malignancy. It is well known that the administration of these hormones to the menopausal woman may at times cause irregular staining[12] or even frank hæmorrhage. When staining does occur in a woman who has not menstruated for some time the question of possible malignancy of the uterus or ovary always comes up. It often becomes necessary to perform a curettage to rule this out. Later if treatment is resumed and staining recurs the same problem reasserts itself. It is true that one can stop treatment and wait to see if the staining will stop, but this entails a period of anxiety without treatment and is not very satisfactory either for the patient or the doctor.[13]

Cases of severe hæmorrhage have been reported[14] requiring packing, transfusion and even hysterectomy following œstrogen therapy. Certainly it should be given with great caution to any woman with fibroids or an enlarged uterus or one who has had a history of profuse or irregular bleeding. The treatment with synthetic œstrogene although not so expensive is sometimes associated with unpleasant side effects and reactions.[15] Cases of serious illness and liver degeneration[16] have been reported. The treatment with natural œstrogens produces usually fewer side effects but is often quite expensive, particularly when it has to be given for years. The underlying instability of the vegetative nervous system is not corrected by œstrogen therapy so that the patient still has symptoms associated with this system which manifest themselves during periods of stress, and no attempt has been made to overcome this instability.

Last but not least there is a tendency with hormone treatment to overlook the psychosomatic factors associated with the climacterium. In this connection it is well to emphasize the importance of the psychological effects of the cessation of menses.[17] There is often fear of developing male characteristics, fear of loss of sex desire or sex appeal, fear of getting stout and concern about growing old. These fears are a real factor in producing and aggravating the symptoms of the menopause. The patient requires time to adjust herself mentally to the change, after which symptoms will improve. Reassurance from the doctor regarding the lack of foundation for her fears will help a great deal during this period of adjustment.

Of course the fact that the patient knows or thinks she is receiving ovarian hormones is of distinct psychological value in many cases. We are not implying that the administration of these hormones does not help, *per se*, by raising the œstrogen level but we do feel that part of their effect may be psychological.[18] It gives the patient the feeling that she is being kept young even though it be artificially and that the ill awaited day of her beginning decadence is being postponed. There is little doubt that the psychological effect of hormone injections is often just as important as raising the blood œstrogen level in controlling the symptoms of certain patients. It would seem more logical to give her much needed reassurance than to resort to injections for their psycho-therapeutic value. Novak[19] states that only a minority of women require organotherapy, and Hamblen[20] rightly comments that when psychotherapy and mild sedatives will suffice, there is no need for organotherapy.

It is interesting to observe that a patient who is adequately controlled with œstrogens will often note a return of her symptoms if anything happens to upset her. Thus if she has a quarrel with her husband, or is worried about anything, or if her resistance is lowered by infection, she is likely to find her previous dosage inadequate to control her symptoms. This is further evidence that the vegetative nervous system imbalance is the basic cause for the symptoms. It is our opinion that therapy should be directed primarily to this system. We have found an excellent combination for this purpose to be: ergotamine tartrate for its effect on the sympathetic nervous system; belladonna for its effect on the parasympathetic nervous system; and phenobarbital for its effect on the central nervous system. These drugs can be obtained combined in suitable dosage in tablet form.*

* The combination of ergotamine tartrate, belladonna and phenobarbital in tablet form, referred to in this paper, has the proprietary name of bellergal. (Sandoz)

For the past five years we have been treating our menopausal patients in three ways: (1) Reassurance or psychotherapy. (2) Reassurance and drugs to stabilize the central and autonomic nervous systems. (3) Reassurance plus a combination of œstrogens and stabilizing drugs.

We have found that the great majority of patients will get adequate relief from proper psychotherapy and small doses of vegetative nervous system stabilizing drugs.[21] Usually the dose can be decreased and stopped entirely in five to six months. No ill effects have been noted, no habituation and there is no worry about bleeding or carcinogenesis.

In some cases where the symptoms are very severe it is well to start with large doses of œstrogens or androgens for a few weeks, combined with stabilizing drugs, after which the hormonal treatment can be rapidly reduced and stopped, certainly within three months.[22]

It must be admitted that we still do not have available any drugs which will adequately control the vasomotor instability of the menopause. In those cases where hot flushes and chills are the chief complaints the best results are obtained by giving œstrogens in gradually decreasing doses combined with the stabilizing drugs mentioned. There is a great deal of research going on at present on drugs which will stabilize the vasomotor portion of the vegetative nervous system. It is to be hoped that an ideal drug for this purpose will soon be found.

For the present our procedure is to give ergotamine tartrate, belladonna and phenobarbital combined, one tablet, three times daily before meals for three weeks out of four, together with papaverine, one grain, three times daily before meals continually. After two months, depending on the patient, the dose is reduced to twice a day for each drug and later to once a day. We aim to stop all treatment within six months. This is usually possible. Occasionally when upset the patient will get a flareup but this is quickly controlled with reassurance and stabilizing drugs given for a week or two. It is interesting to note that the same treatment started ten days before a menstrual period and continued through the period will often relieve severe dysmenorrhœa and many other menstrual symptoms which are autonomic in origin.

We would suggest that the logical treatment for the menopause should be: (1) Reassurance or psychotherapy in all cases. (2) No other treatment in very mild cases. (3) Autonomic nervous system drugs in moderate cases. (4) A combination of œstrogens and vegetative nervous system drugs in severe cases, but the œstrogens should not be continued longer than a few months and the other drugs should also be stopped within three to six months and then used only as required. (5) Treatment of specific systems as indicated, *i.e.*, bromides for restlessness and irritability, advice as to diet and elimination for gastro-intestinal symptoms, heat, salicylates and massage for arthritic symptoms, and so on, paying particular attention to the patient's complaints.

These patients are going through a very difficult period of adjustment. They deserve our best care and understanding. It is not fair to put them off with some hormones and make no attempt to adjust their underlying difficulties with proper medicinal and psychosomatic therapy.

Our purpose in presenting this paper is to emphasize an old method of treatment which is being neglected in the zeal for hormone therapy. We feel that too many patients are given hormone injections or pills for too long a period and without an adequate attempt on the part of the doctor to listen to their complaints, reassure them and treat their affected systems adequately by the other means at our disposal. We would also like to encourage further research for drugs that will stabilize the vegetative and the central nervous system and thus give us a complete and logical answer to the problem which is basically one of vegetative nervous system instability and instability of other body systems rather than ovarian hypofunction.

CASE HISTORIES

A.M., aged 38. This patient has always been high strung and tense. At 32 she had a subtotal hysterectomy and bilateral oöphorectomy for fibroids and cystic ovaries. Following this she had flushes, dizzy spells and typical menopausal syndrome. This was controlled with œstrogens by injection and by mouth for four years. Each time the dose was materially reduced the symptoms recurred. Two years ago she was put on ergotamine tartrate, phenobarbital and belladonna combined, after which it was possible to gradually withdraw the œstrogens within three months and the patient has been well adjusted and happy since.

A.P., aged 53, was still having occasional spotting at time of expected period but no real menstrual flow

for two years. Complains of very bad hot flushes, twenty to thirty a day, night sweats, arthritic pains, headaches, flatulence, nervousness, depression, etc. She was given estynil 0.05 mgm. daily together with ergotamine tartrate, phenobarbital, and belladonna combined, one tablet t.i.d. and papaverine, gr. one t.i.d. Symptoms were all practically gone within three weeks, after which the estynil was decreased to every two days, for one week, then every three days and gradually stopped in three months. The dose of stabilizing drugs was also gradually reduced and the patient after four months' therapy is well adjusted and feels well without any treatment.

REFERENCES

1. HAMBLEN, E. C.: *Endo. Gyn.*, 12: 423, 1939.
2. HAWKINSON, L. F.: *J. Am. M. Ass.*, 111: 390, 1938.
3. FRANK, R. T. AND SALMON, U. J. *Proc. Soc. Exper. Biol. & Med.*, 33: 311, 1935.
4. ALBRIGHT, E.: *Endocrinology*, 20: 24, 1936.
5. KURZROK, R.: Personal communication.
6. FRANK, R. T., GOLDBERGER, M. A., SALMON, U. J. AND FLESHIN, G.: *J. Am. M. Ass.*, 109: 1863, 1937.
7. HAWKINSON, L. F.: *J. Am. M. Ass.*, 111: 390, 1938.
8. HAMBLEN, E. C.: *Endo. Gyn.*, 12: 418, 1939.
9. NOVAK, E.: *Gyn. & Female Endo.*, 36: 470, 1941.
10. AYRE, J. E.: *Am. J. Obst. & Gyn.*, 54: 363, 1947.
11. CHAMORRO, A.: *Compt. rend. Soc. de Biol.*, 137: 325, 1943.
12. NOVAK, E.: *Gyn. & Female Endo.*, 36: 471, 1941.
13. *Idem*: *J. Am. M. Ass.*, 125: 98, 1944.
14. CRON, R. S.: *Am. J. Obst. & Gyn.*, 53: 451, 1946.
15. NOVAK, E.: *Gyn. & Female Endo.*, 36: 471, 1941.
16. SELIGMAN, B.: *Urol. & Cutan. Rev.*, 48: 319, 1944.
17. HAMBLEN, E. C.: *Endo. Gyn.*, 12: 419, 1939.
18. PRATT, J. P. AND THOMAS, W. L.: *J. Am. M. Ass.*, 109: 1875, 1937.
19. NOVAK, E.: *Gyn. & Female Endo.*, 36: 467, 1941.
20. HAMBLEN, E. C.: *Endo. Gyn.*, 12: 423, 1939.
21. PRATT, J. P. AND THOMAS, W. L.: *J. Am. M. Ass.*, 109: 1875, 1937.
22. HAMBLEN, E. C.: *Endo. Gyn.*, 12: 423, 1939.

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MENINGITIS IN CHILDHOOD*

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ONE of the advances in children's diseases in the past twenty-five years, has been the improvement in the results of the treatment of meningitis. If one reviews the records of cases of purulent meningitis admitted to the Hospital for Sick Children, in the pre-chemotherapeutic era, the case fatality rate was practically 100%, with the exception of meningococcal infection. Since the discovery of the sulfonamides and the antibiotics, there has been a marked reduction in the death rate. It is not the purpose of this communication to deal in detail with the various aspects of meningitis. An attempt will be made to familiarize the reader with the incidence of the various bacterial types and the methods we have used at the hospital in bringing about a reduction in mortality of the common types of meningitis.

* From the Wards and Laboratories of the Hospital for Sick Children, the Department of Pædiatrics, University of Toronto, under the direction of Alan Brown, M.D., F.R.C.P.(Lond.).

MATERIAL

From 1919 to the end of the year 1946, there have been no less than 1,325 patients admitted to this hospital suffering from meningitis. In Table I, the incidence of the various types is tabulated. Over this same period, the yearly incidence of the various types of meningitis is shown in Chart 1, and Chart 2. In Chart 1, it will be noted that cases of tuberculous meningitis showed a high incidence in the years 1920 to 1933. From 1933 to 1941 there was a marked fall in the number of cases of this disease but during 1942 and 1946, the indication was that more cases were being admitted to hospital. Influenzal and pneumococcal meningitis have occurred only as sporadic diseases during these years, with from only 2 to 14 cases a year. In Chart 2 is shown the incidence of meningococcal infections each year. This chart shows three peaks. In 1919 there were 20 cases; 1930-31, 18 to 20 cases; and from 1939 to 1945, there was a marked increase in the number of children admitted to the hospital with this disease, (45 cases in 1941). Streptococcal meningitis has occurred as a sporadic disease similar to influenzal and pneumococcal meningitis, ranging from as few as 3 cases to as many as 15 cases yearly. From 1941, however, there has been a gradual trend downward, until in 1945 and 1946, there was only one case each year. Staphylococcal meningitis is very rare and only 26 patients have been seen in 25 years.

TABLE I.

MENINGITIS—BACTERIAL TYPES, 1919 TO 1946
HOSPITAL FOR SICK CHILDREN, TORONTO

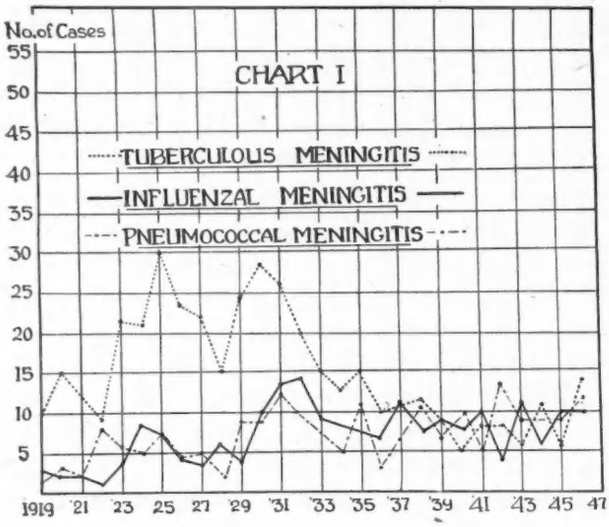
1. Tuberculous	413
2. Meningococcal infections	317
3. Pneumococcal	195
4. Influenzal	191
5. Streptococcal	183
6. Staphylococcal	26
Total	1,325

DISCUSSION OF THE RESULTS OF TREATMENT

Tuberculous meningitis.—So far, we have had no success in the treatment of tuberculous meningitis. Some of our recent cases have been treated with streptomycin intrathecally and intramuscularly without success. Usually 100,000 units of streptomycin are given intrathecally each day and approximately 1,000,000 units intramuscularly daily.

Meningococcal infections.—In Table II a summary of the treatment of this disease is shown.

During the years in which we used anti-meningococcal polyvalent horse serum, 122 cases were treated with 82 recoveries, a case fatality of 33%. Fifty-six patients were treated with the same serum and one of the sulfonamides, resulting in a case fatality rate of 11%. When chemotherapy was used without serum, we had a case fatality rate of 14% in 123 cases treated. If however, one eliminates from this last group 15 fulminating types, our case fatality rate was 2%. It was noted that during the year 1943, there was a noticeable increase in the number of fulminating cases.[1] Three patients suffering from meningococcæmia received no treatment and recovered. The recovery of these patients coincided with the development of bactericidal action in their blood against their own infecting strains.[2]



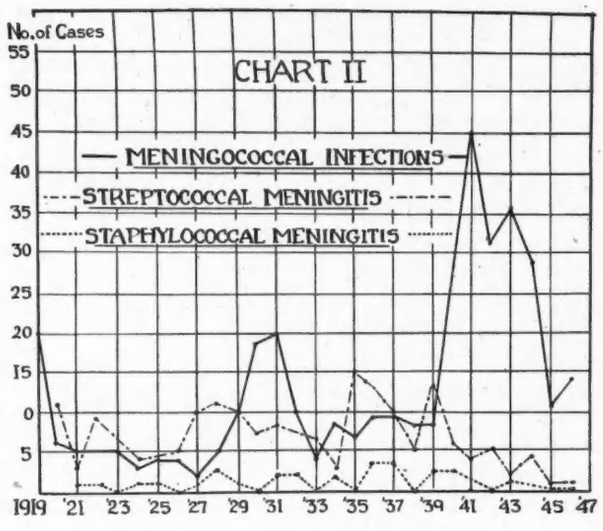


TABLE II.

MENINGOCOCCAL INFECTIONS, 1919 TO 1946
HOSPITAL FOR SICK CHILDREN, TORONTO

Treatment	*Cases*	*Recovered*	*Case fatality percentage*
Serum	122	82	33
Serum and chemotherapy	56	50	11[1]
Chemotherapy	123	106	14[2]
No time to treat	13	0	100
No treatment[3]	3	3	0
Total	317	241	24

1. One case fulminating type if eliminated, case fatality is 10%.

2. Fifteen cases fulminating type if eliminated case fatality is 2%.

3. Three cases developed bactericidal power to their infecting strain.

Pneumococcal meningitis (Table III). — In past years, 121 patients with pneumococcal meningitis died, a case fatality of 100%. Out of 49 patients treated with the sulfonamides, 7 recovered, a case fatality of 86%. In recent years, 19 patients have been treated with sulfadiazine and penicillin with 13 recoveries, a case fatality of 32%. Since the use of penicillin intravenously or intramuscularly and intrathecally in this disease, there has been a marked reduction in deaths.

TABLE III.

PNEUMOCOCCAL MENINGITIS, 1919 TO 1946
HOSPITAL FOR SICK CHILDREN, TORONTO

Treatment	*Cases*	*Recovered*	*Case fatality percentage*
General	121	0	100
Sulfonamides*	49	7	86
Sulfonamides and penicillin	19	13	32
No time to treat	6	0	100
Total	195	20	90

* In this group type specific serum was occasionally given.

Influenzal meningitis (Table IV).—This disease in the past has shown an equally high fatality rate, 98% in 71 cases. Later we used anti-influenzal meningitis horse serum (Fothergill) and fresh human complement in the treatment of 50 cases with 11 recoveries, a case fatality of 78%. Another group of 20 patients was treated with the same serum just referred to, or with an antibactericidal guinea pig serum containing complement and in addition sulfonamides with 5 recoveries, a case fatality of 75%. Later a group of 25 patients was treated with anti-influenzal meningitis rabbit serum (concentrated), (Alexander) and sulfonamides, with 14 recoveries, a case fatality of 44%. Another

group of 17 patients was treated with sulfonamides only, with 8 recoveries, a case fatality of 53%. In the last year, 1946, 8 patients have been treated with streptomycin intrathecally and intramuscularly with or without sulfonamides, with 6 recoveries, a case fatality of 25%. If present results are continued, it is felt that streptomycin in large enough doses will cure practically all patients with this disease if the patients are admitted in the early stages. The only patients in this series and those subsequently treated that have died, have been sent to the hospital after their disease had been present for some time. These cases would not recover with any form of treatment.

TABLE IV.

INFLUENZAL-MENINGITIS, 1919 TO 1946
HOSPITAL FOR SICK CHILDREN, TORONTO

Treatment	*Cases*	*Recovered*	*Case fatality percentage*
General	71	1	98
Serum[1]	50	11	78
Serum[2] and sulfonamides	20	5	75
Serum[3] and sulfonamides	25	14	44
Sulfonamides	17	8	53
Streptomycin with and without sulfonamides	8	6	25
Total	191	45	58

1. Anti-influenzal meningitis horse serum (Fothergill).
2. Anti-influenzal meningitis horse serum or guinea pig immune serum.
3. Anti-influenzal meningitis rabbit serum (concentrated).

Streptococcal meningitis (Table V).—In the past, there have been 136 cases of streptococcal meningitis, with 2 recoveries, a case fatality of 98%. Since the use of sulfonamides, with or without penicillin, in 47 cases, there have been 26 recoveries, a case fatality of 45%. From Chart 2 it is to be noted that very few cases of this disease have occurred in the last five years. In 1945 and 1946, only one patient with this disease was admitted each year.

Staphylococcal meningitis (Table VI).—There is very little to note that is not obvious from the Table in the treatment of this disease.

TABLE V.

STREPTOCOCCAL MENINGITIS, 1920 TO 1946
HOSPITAL FOR SICK CHILDREN, TORONTO

Treatment	*Cases*	*Recovered*	*Case fatality percentage*
General*	136	2	98
Sulfonamides and/or penicillin	47	26	45
Total	183	28	85

* Mastoidectomy and other therapeutic procedures as indicated.

TABLE VI.

STAPHYLOCOCCAL MENINGITIS, 1921 TO 1946

	Cases	*Recovered*
General	23	1
Sulfonamides and/or penicillin	3	1
Total	26	2

PLAN OF TREATMENT

Continuous intravenous therapy.—All cases of purulent meningitis receive a continuous intravenous injection of Ringer lactate solution or two-thirds 5% glucose and one-third normal saline to supply food and fluids to a child who is critically ill and in a dehydrated state.

Lumbar puncture is done daily or periodically, depending on whether or not the patient is receiving intrathecal treatment daily. The spinal fluid is examined by smear and culture to determine the bacterial species. If the child is found to be suffering from staphylococcal, pneumococcal or streptococcal meningitis, daily doses of 100,000 units of penicillin are given intrathecally, unless there is a severe reaction. Streptomycin in this dosage is given intrathecally to cases of influenzal meningitis. The level of these antibiotics is measured in the sample of spinal fluid sent to the laboratory to ensure that the level of the antibiotic in the spinal fluid is above the level to which the culture is resistant. This treatment is carried on for at least five days and until sterile cultures of spinal fluid are repeatedly obtained.

Intravenous and intramuscular therapy.—Sulfadiazine, (soluble solution) and penicillin are given intravenously by injecting them into the rubber tubing leading to the drip bulb at periodic intervals. Soluble sulfadiazine is given in this way in a dosage of 3 grains per pound body weight per day along with 10 to 20 grains of sodium bicarbonate every 4 hours by mouth. The level of the drug in the spinal fluid is followed periodically and if the drug level goes over 15 mgm. % in the spinal fluid, the dose is reduced to 2 grains per pound per day and later to 1 grain per pound per day. Penicillin is given in from 100,000 to 500,000 units daily in divided doses intravenously or intramuscularly. Streptomycin is used only in cases of influenzal meningitis intramuscularly in a dosage of 100,000 units every 3 hours as well as 100,000 units intrathecally daily.

Transfusion.—Since practically all patients with meningitis become anæmic during the course of their disease, one or two blood trans-

fusions, when indicated, are given in the first week of the disease.

Foci of infection.—If at the onset or during the course of the disease, extrameningeal foci of infection are present or develop, these foci are drained. The surgical procedure is always done after the drug levels are within a satisfactory therapeutic range.

Discontinuing treatment.—After the patient has improved clinically and begins to take fluids well, usually 2 to 4 days after admission, the intravenous therapy is discontinued. The drug therapy is usually continued for at least five days or longer. The drug is discontinued after clinical improvement, after the spinal fluid cell count has fallen to approximately normal levels and after several sterile cultures of spinal fluid are obtained.

SUMMARY

1. A survey is made of the patients admitted to the Hospital for Sick Children in the last 25 years with the common types of meningitis.

2. An outline of the different bacterial types is presented, referring to methods and the results of treatment.

REFERENCES

1. SILVERTHORNE, N.: *Canad. M. A. J.*, 52: 252, 1945.
2. *Idem*: *J. Pædiat.*, 23: 155, 1943.

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RÉSUMÉ

Revue des principales étiologies et statistiques. Une routine thérapeutique est scrupuleusement suivie: sérum intraveineux continuel chez tous les enfants qui sont très touchés et très déshydratés; ponction lombaire quotidienne ou périodique et examens complets du l.c.r., comprenant le dosage du médicament utilisé; injections intraspinales, intraveineuses et intramusculaires selon les cas et indications; transfusions sanguines au besoin; les foyers d'infection extra-méningés sont ouverts et drainés. Le traitement intraveineux cesse vers le 4ième jour et toute thérapeutique cesse lorsque le l.c.r. est redevenu normal.

JEAN SAUCIER

SEQUELÆ OF LOCAL EXPOSURE TO COLD*

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INDIVIDUAL cases of frost bite and exposure to cold are probably familiar to most people who have lived or practised in northern latitudes, but it is only during military campaigns that any large groups are afflicted under fairly uniform conditions and any representative number come under the care of one observer. It is only under such circumstances that it is possible to follow any large number of cases of prolonged chilling through their numerous sequelæ.

The acute conditions of trench and immersion foot have been fairly well recorded during the past war, and some follow-up studies have been published. In our own series of about 150 cases the follow-up has been practically impossible, as these men were merchant mariners of all nationalities and are now scattered all over the globe, with no forwarding address. However, one receives occasional letters from the patients themselves, and from doctors who have seen them since, and are kind enough to forward a report to us. It is the aim of this paper to attempt to classify this material and perhaps clarify our ideas.

As a background we should perhaps review our knowledge of the effect of cold on tissues. The initial clinical picture of frost bite and chilling is familiar to almost everyone but the physiological and pathological changes are still somewhat obscure and a matter of some controversy. Anyone interested in this subject should reread Sir Thomas Lewis' investigations published in 1927. He came to the conclusion that the damage was due to the liberation of histamine or a histamine-like substance from the damaged tissues, producing dilatation of the vessels with increased permeability, leading to œdema and vesiccation. This in turn produces an oxygen deficit by increased tissue metabolism, and if this is not met there is anoxia and tissue death. This fundamental investigation has been augmented by observations of many workers in this field who generally agree that vascular dysfunction is responsible for most of the damage. Green, Leriche, etc., reported dilatation of the vessels, thrombosis vacuolation of muscle fibres and subsequent necrosis.

Fuhrman and Crismon recently reported that in their studies of gangrene following experimental frost bite the tissue fluid showed no evidence of containing any histamine-like substance. Kreyberg, supported by Greens and later by Quintanilla demonstrated a very interesting and undoubtedly fundamental observation in the vessels of tissues damaged by cold. They showed that soon after the trauma, the vessel walls apparently became permeable to

* Read at the Seventy-eighth Annual Meeting of the Canadian Medical Association, Armed Forces Medical Section, Winnipeg, June 27, 1947.

plasma in an abnormal degree, which leaked away rapidly, leaving the cells to concentrate in the lumen of the vessel. Movement soon ceased and anoxia naturally occured. While this has the appearance of thrombosis, there is no agglutination and Kreyberg likes to use the term "silting" of the corpuscles.

The question of thrombosis has been frequently discussed but until recently little work has been done on the subject. Lange, Boyd, and Lange, Boyd and Loewe in 1944 reported both experimental and clinical benefit by the use of heparin. This work could not be confirmed by Quintinilla *et al.* These investigators found in carefully controlled experiments on frozen rabbits' feet that the administration of heparin did not appear to save any tissue and that the controls did just as well as the heparinized animals. A purely physical damage has been suggested as being responsible for the injury. Ice crystals forming in the lumina of the vessels disrupt them as well as the capsules of the cells. The slower the freezing the larger the crystals and the greater the damage. Investigation of the nerves in chilled tissues has shown considerable damage to them including swelling of the axis-cylinders, demyelinization and later fibrosis, of which we shall speak later.

OUR OBSERVATIONS

First of all we must recognize that there is a tremendous individual variation in susceptibility to damage by cold. We have seen men exposed to the same trauma escape unscathed while others suffered severe damage, even going to amputation. This peculiar resistance by some individuals has been observed in experimental work as well. The feet of rabbits placed in freezing mixtures to –20° C. were often undamaged while others were lost. Occasionally this occurred in the same animal. This variable response is unexplained but must be kept in mind when evaluating any form of treatment whether therapeutic or prophylactic.

Another problem is to evaluate the amount of damage done. It appears impossible either from the history of the exposure or the initial observation of the injured part to foretell the ultimate outcome. This lack of accurate information is important because it is at this point, at the thawing period, that any treatment, if any can be given, is to be instituted. There is no doubt that damage depends on the depth of chilling, which in turn depends on the length of exposure and the degree of cold. The depth of chilling is much more deceptive than the depth of a burn for instance, and except in very mild cases it is impossible to forecast what loss of tissue will occur. Prolonged chilling is usually more disastrous than rapid freezing, as the wet environment as in the case of trench and immersion foot leads to rapid conduction of heat and a lowered temperature throughout the whole exposed limb.

The subsequent states of chilling are familiar to all; the initial blanching, then the hyperæmia and œdema, vesiccation and finally necrosis. In between the mild cases that recover completely and the extreme cases that become gangrenous are a series of sequelæ that are sometimes annoying and more often incapacitating. It is these cases that survive the initial exposure that I shall deal with.

It has been found convenient to divide these cases into four groups. These are by no means sharply defined and frequently overlap.

1. There are first of all the mildest cases that have a prolonged anæsthesia and paræsthesia. The feet are occasionally numb in widely distributed and unrelated areas. There are scattered areas of hyperæsthesia, the arches ache and the toes are painful but there is no objective evidence of damage to be seen.

2. Then there is a group that has severe pain. The gait is altered, the feet ache, there are lightning and lancinating pains. There is inability to stand for any length of time, and there appears to be a lowered ability to adjust to variation in temperature. There is often some limitation of flexion or extension of the toes and extreme sensitivity under the metatarsal heads. This painful sequel has been well described by White, who has studied biopsy material. His sections showed a striking increase in the intercellular fibrous tissue which has been almost entirely replaced by collagen. The arterioles and venules show partial to almost complete occlusion, due to increase of fibrous tissue in the walls. The arteries and veins show the same thickening but with less occlusion. The nerves are imbedded in this

fairly dense fibrous tissue and may exhibit œdema and Wallerian degeneration. There is also fibrosis in individual and groups of muscle fibres together with atrophy. White feels that these people will continue to have pain as long as the fibrous tissue is contracting, anywhere from six to twelve months or longer.

3. The third group is composed of those who show more profound and prolonged changes that are disabling and incapacitating. These patients exhibit varying degrees of such objective signs as glossy skin, cyanosis, hyperhidrosis, deformed nails and tapered phalanges. There is x-ray evidence of osteoporosis and they suffer more pain. A few have persistent ulcers. The glossy skin is tight, with considerable loss of elastic tissue and with lessened resistance to trauma. It abrades and cracks readily, and is prone to infection. Sweating is one of the most interesting and disabling of the conditions present. In these cases there is a profound disturbance of the sweating mechanism, apparently a sympathetic imbalance that produces a state of continual dripping that is both a source of annoyance and a disability to the affected person. It soaks the socks and shoes, producing chilling. In the hands it is a source of embarrassment and more practically interferes with gripping. It is a social and practical disability. The extremities show a tendency to œdema which is often more extensive than is realized by the usual clinical test of pitting. This is probably due to the interstitial fibrosis that confines the œdema to the deeper tissues. The deformity of the nails is often that of an onychogryposis with occasional loss, but more often thickened and curved with marked ridging. Osteoporosis is demonstrated by x-ray and is probably attributable to circulatory disturbances as well as non-use.

Subsequently these patients have severe pain that is variable in its distribution. They describe their pains as aching, shooting, tingling, numbness and many are unable to bear weight for long periods; those that attempt it have a peculiar stamping gait, taking their weight first on their heels or over the calcaneal area, somewhat resembling that of a tabetic patient. They raise their feet high, placing them firmly down, often seeking support from a cane or bed as though their proprioceptive impulses were deficient.

4. The fourth group are those that suffer tissue loss including parts of or all the toes and portions or all of the feet. They may suffer any or all of the disabilities mentioned before.

TREATMENT

The treatment of all these patients has to be individualized. One must observe the objective signs and carefully evaluate the response to therapy. The essence of treatment is time. It must be realized that these disabilities are of long duration, but given sufficient time will undergo a certain amount of resolution that will enable patients to carry on their former employment, especially if it be one of a sedentary character. This process may be slow and extend over a period of years. Physiotherapy will help these patients considerably; such treatment as general reconditioning and specific efforts directed towards the atrophy of the intrinsic muscles of the feet and the concomitant small joint stiffness. Efforts should also be made to improve the local circulation by such methods as active exercise and wax baths. There is a group that appears to be benefited by an attempt to restore the sympathetic balance either by repeated blocking of the appropriate ganglia or by actual sympathectomy. This eliminates the troublesome sweating and often converts a cold wet foot to a hot dry one, and in some cases will improve the paræsthesias. There is often improvement in the characteristic deformities such as the atrophic tingling phalanges with deformed nails and shiny skin. There appears to be a general improvement and restoration of the normal thickness of the skin.

When amputation is indicated it should be deferred as long as possible. We have always been surprised at the recovery that can take place in an apparently hopeless extremity, and the initial line of demarcation is not necessarily the final one. I think too that we should be conservative in the amount of tissue we remove. We have seen men who have lost several toes, even including the great toe, walk very well, and even cases which have lost all their toes even portions of the metatarsals and have had to have the deficiency closed by a pedicle graft, walk with very little disablement.

A very interesting observation has been made by Greely of the U.S. Navy, and Woolhouse and others at the Queen Mary Hospital, Montreal, that in some cases repeated blocks

lead to a lengthening of the periods during which the effects are observed, and finally these results are permanent and blocks or sympathectomy are no longer necessary.

It should again be emphasized that exposure to cold may be followed by prolonged disabilities which should be taken into consideration by medical boards and pension tribunals when an assessment is being made.

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RÉSUMÉ

Rappel physio-pathologique de l'action du froid sur les tissus. La résistance au froid varie beacoup selon les individus. Il est difficile de prévoir à la phase initiale quelle sera l'importance des dégâts ultérieurs. L'exposition prolongée est plus sérieuse qu'une engelure survenue rapidement. On peut observer tous les degrés depuis la simple hyperémie jusju'à la nécrose. Une gradation de 4 catégories est décrite: (1) simple paresthésie ou anesthésie prolongée; (2) parésie, douleurs, occlusion partielle des vaisseaux, œdème, algies pendant plusieurs mois; (3) cyanose, transpiration abondante, fibroses interstitielle, et, (4) nécroses localisées ou généralisées. Le traitement variera selon les individus. La physiothérapie sera longtemps prolongée. On améliorera la circulation locale. Les opérations sur le sympathique seront envisagées selon leurs indications. On retardera le plus possible la décision d'amputer. Les blocages du sympathique ont rendu de grands services. Il s'agit souvent d'états et de traitements qui dureront très longtemps. JEAN SAUCIER

ESTIMATION OF SERUM ACID PHOSPHATASE IN THE DIAGNOSIS OF METASTASIZING CARCINOMA OF THE PROSTATE*

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ESTIMATION of serum acid phosphatase is now widely used as an aid to the diagnosis of metastasizing prostatic carcinoma. As there are a number of excellent reviews in the literature,[1 to 6] a brief outline of the present status only will be given here.

Acid phosphatase is present in large amounts in the normal adult human prostate gland. Many other normal tissues, as well as normal serum, contain acid phosphatase but the amounts are small in comparison with those found in the prostate. There are several types of acid phosphatase, and the prostatic type has properties which clearly distinguish it from those of other normal tissues and of normal serum. The acid phosphatase of normal serum is probably derived from a variety of tissues, including liver, kidney, spleen and bone, but does not include detectable amounts of the prostatic enzyme. Under normal conditions, prostatic acid phosphatase is confined to the prostate gland and its external secretion.

In cases of prostatic carcinoma, large amounts of prostatic acid phosphatase may be produced by the malignant tissue and, if metastatic spread occurs, the enzyme may escape into the blood. The acid phosphatase activity of the serum then rises, often to very high levels. Other diseases, notably those of bone and liver, may lead to elevation of serum acid phosphatase. In the latter instances none of the serum acid phosphatase is of prostatic origin and the elevations met with are small in comparison with those which can occur in cases of metastasizing prostatic carcinoma.

Although the general principles involved in the interpretation of serum acid phosphatase levels are well established, and it is known that marked elevations occur in metastasizing prostatic carcinoma only, there is need for more information concerning normal values and interpretation of slightly elevated values. To obtain such information, an analysis was made of the results of estimations of the acid phosphatase activities of sera of 500 patients admitted to the wards of the Montreal General Hospital. The group comprised 113 cases of prostatic carcinoma, 145 cases of benign prostatic adenoma or hypertrophy, and 242 cases of miscellaneous diseases not involving the prostate gland.

SELECTION OF CASES

Tests were done in a wide variety of miscellaneous diseases, but in selecting cases preference was given to disorders of the prostate gland, bone and liver. Selection was therefore not a random one. Adults only were studied; the minimum age was 21 years.

TECHNIQUE OF ESTIMATION OF SERUM ACID PHOSPHATASE

Serum acid phosphatase was estimated by the Gutman technique[7] and expressed in units as defined by the Gutmans.[7] Tests on hæmolyzed sera were excluded.[8] Benotti, Rosenberg and Dewey[9] found that the Gutman technique may at times yield erroneously high values due to acid hydrolysis of the substrate during incubation. The Gutmans[10] found no evidence of such hydrolysis.

* From the Department of Metabolism and Toxicology, the Montreal General Hospital, Montreal, Que. This work was done with the aid of a grant from Mr. T. Howard Stewart, a Governor of this Hospital.

Incubation of our buffered substrate without serum showed slight hydrolysis only; in 57 experiments the maximum, minimum and average values calculated as serum acid phosphatase were 1.0, 0.2 and 0.6 units respectively. No correction for this has been made in our calculation of serum values.

The Gutmans[7] recommended use of a three hour incubation period, whereas others have modified the Gutman technique by shortening this period to one hour[4, 11] or thirty minutes.[12] A three hour period was used in our estimations. Comparative tests (Table I) have shown the values to be influenced by the length of incubation. Normal standards and interpretations of slightly elevated values based on tests in which a three hour period has been used are therefore not applicable to values obtained with shorter periods.

It should here be noted that methods of estimation of serum acid phosphatase, other than the Gutman technique, have been developed and are in use in many laboratories.

TABLE I.

ACID PHOSPHATASE ACTIVITIES OF 150 SERA ESTIMATED BY THE GUTMAN TECHNIQUE USING INCUBATION PERIODS OF THREE HOURS AND ONE HOUR

Serum acid phosphatase 3 hour period (Gutman units)	*Number of tests*	*Serum acid phosphatase—1 hour period (Gutman units)*		
		Maximum	*Minimum*	*Average*
1	27	3	1	1.7
2	47	5	1	3.1
3	58	7	2	4.2
4	18	8	4	5.8

The general principles underlying the interpretation of serum acid phosphatase levels are applicable to values obtained by any of these techniques and, with each, very high values are met with in metastasizing prostatic carcinoma only. However, normal standards and interpretations of slightly elevated values based on results of one method are not applicable to values obtained by another method.

RESULTS

Normal values.—Our normal values (Table II) are based on estimations in 63 cases with no disease of bone, liver, biliary tract or prostate gland. All cases with malignant disease of any type or extent were excluded, in view of the possible presence of undetected metastases to bone or liver. When two or more tests were done in one case, the higher or highest value was taken. All values were between 1 and 4 units.

TABLE II.

NORMAL VALUES OF SERUM ACID PHOSPHATASE

Serum acid phosphatase (Gutman units)	*Number of cases*
1	1
2	21
3	29
4	12
Total	63

Diseases not involving the prostate gland.—Estimations were made in 242 cases (Table III).

TABLE III.

SERUM ACID PHOSPHATASE IN DISEASES NOT INVOLVING THE PROSTATE GLAND

Serum acid phosphatase (Gutman units)	*Number of cases*
1	13
2	70
3	86
4	52
5	14
6	3
7	2
8	2
Total	242

This group includes the 63 cases used for determination of normal values. When two or more tests were done in one case, the higher or highest value was taken. The highest value met with was 8 units. Values above 4 units were found in 21 cases; the diagnoses in these are shown in Table IV.

TABLE IV.

DIAGNOSES IN CASES OF NON-PROSTATIC DISEASE WITH ELEVATED SERUM ACID PHOSPHATASE VALUES

Diagnosis	*Number of cases*
Carcinoma of breast with metastases to bones and lungs	3
Carcinoma of adrenal glands with metastases to liver, bones and lungs	1
Carcinoma of stomach with metastases to liver, bones, lungs, spleen and adrenal glands	1
Paget's disease of bone	2
Multiple myelomatosis	1
Cirrhosis of liver	4
Hepatitis	2
Carcinoma of pancreas with obstructive jaundice	2
Cholelithiasis with obstructive jaundice	1
Chronic rheumatoid arthritis with osteoporosis	1
Carcinoma of urinary bladder (with no invasion of prostate gland)	2
Bronchogenic carcinoma	1

Of the 21 cases with high serum acid phosphatase values, serum alkaline phosphatase was normal in 13 and elevated in 8.*

* Throughout this investigation, serum alkaline phosphatase was determined by the method of King and Armstrong.[13] In our experience the normal range in adults is 1 to 11 units. This estimate is based on tests in 136 hospital cases of age 21 years or more with no disease of bone, liver or biliary tract; all cases with malignant disease of any type or extent were excluded from this group, in view of the possible presence of undetected metastases to bone or liver.

Benign prostatic disease.—Estimations were made in 145 cases of benign prostatic adenoma or hypertrophy (Table V). When two or more tests were done in one case, the higher or highest value was taken. The highest value met with was 6 units. Values above 4 units were found in 5 cases; in none was there evidence of any non-prostatic disease to account for the high value. The diagnosis of prostatic adenoma was confirmed by microscopic examination of tissue removed surgically in 3 of these 5 cases; in the remaining 2 the diagnosis was based on clinical examination only.

TABLE V.

SERUM ACID PHOSPHATASE IN BENIGN PROSTATIC ADENOMA OR HYPERTROPHY

Serum acid phosphatase (Gutman units)	*Number of cases*
1	14
2	44
3	61
4	21
5	2
6	3
Total	145

Prostatic carcinoma.—Estimations were made in 113 cases (Table VI). Since values are known to be influenced by androgen control therapy, all tests done after castration or use of œstrogens were excluded. When two or more tests were done in one case, the higher or highest value was taken. The highest value met with was 50 units. Values above 4 units were found in 50 cases; in 27, values were higher than the maximum level of 8 units met with in diseases other than prostatic carcinoma and in the remaining 23, the degree of elevation was of the order encountered in non-prostatic diseases (5 to 8 units).

TABLE VI.

SERUM ACID PHOSPHATASE IN PROSTATIC CARCINOMA—ALL CASES

Serum acid phosphatase (Gutman units)	*Number of cases*
1 to 4	63
5 to 8	23
9 +	27
Total	113

Serum alkaline phosphatase was measured in 46 of the 50 cases with high serum acid phosphatase values and was found to be elevated in 22 and normal in 24. In 91 cases, estimation of serum alkaline phosphatase and roentgenological examination of the pelvis and lumbar spine were done. On the basis of these, the cases were divided into those with and without metastases (Table VII). The data show the expected relationship between serum acid phosphatase values and the presence or absence of metastases as demonstrated by other means. Thus of 51 cases with no demonstrable metastases, serum acid phosphatase was normal in 36, whereas of 40 cases with metastases, normal values were found in 11 only.

TABLE VII.

SERUM ACID PHOSPHATASE IN PROSTATIC CARCINOMA WITH AND WITHOUT EVIDENCE OF METASTASES*

Serum acid phosphatase (Gutman units)	*Number of cases*	
	With metastases	*Without metastases*
1 to 4	11	36
5 to 8	10	9
9 +	19	6
Total	40	51

* Based on roentgenological examination of pelvis and lumbar spine and estimation of serum alkaline phosphatase.

DISCUSSION OF RESULTS

Our normal values (Table II) agree with those reported by Herger and Sauer,[1, 14] who also used the Gutman technique with an incubation period of 3 hours, but are higher than those obtained by Gutman's group,[2, 3, 7, 10] who found the upper limit of the normal range to be 2 to 3 units only. The normal range with the use of the Gutman technique, modified by shortening the incubation period to one hour, has been reported to be 1 to 5 units.[4, 11] Our study of the effect of shortening the incubation period to one hour (Table I) shows that sera giving normal values with the three hour period may give values as high as 8 units with the shorter period.

Our data show that elevated values of serum acid phosphatase of the order of 5 to 8 units may occur in the absence of prostatic disease (Tables III and IV). Failure to recognize that high values of serum acid phosphatase can occur in the absence of prostatic carcinoma may lead to incorrect diagnoses. Thus in two of our cases with values of 7 and 8 units respectively, a diagnosis of metastasizing prostatic carcinoma was made on the basis of the elevated values, œstrogens were given without beneficial effect and, in one case, castration was planned but not done. Post-mortem examination revealed carcinoma of stomach and of

adrenals respectively with widespread metastases and no prostatic carcinoma (Table IV).

Our data also show that, in both non-prostatic diseases and prostatic carcinoma, elevation of serum acid phosphatase may be accompanied by either a normal or an elevated serum alkaline phosphatase. Estimation of serum alkaline phosphatase is therefore of no assistance in distinguishing between high serum acid phosphatase values of non-prostatic and prostatic origins. High values of serum acid phosphatase of the order of 5 and 6 units only were found in 5 of 145 cases of benign prostatic disease (Table V). The diagnosis of prostatic adenoma was confirmed by microscopic examination of tissue removed surgically in 3 of the 5 cases, but this does not exclude the possibility that prostatic carcinoma was present. Without unequivocal proof of the absence of prostatic carcinoma on the basis of post-mortem examination, such cases cannot be accepted as evidence of elevation of serum acid phosphatase by benign prostatic disease.

The findings in prostatic carcinoma (Tables VI and VII) demonstrate both the value and limitations of estimation of serum acid phosphatase as a diagnostic test. The data show that prostatic carcinoma may produce rises of serum acid phosphatase to levels higher than are met with in any other disease. Thus values above 8 units were found in 27 of 113 cases (Table VI). In such instances the findings are diagnostic of metastasizing prostatic carcinoma and interpretation therefore presents no difficulty. On the other hand, normal values were found in 11 of 40 cases of prostatic carcinoma with metastases demonstrated by other means (Table VII), and elevated values, within the range met with in non-prostatic diseases, were found in 23 of the entire group of 113 cases (Table VI). Normal values do not exclude the presence of metastasizing prostatic carcinoma and high values of the order of 5 to 8 units only, although suggestive of metastasizing prostatic carcinoma, do not prove its presence.*

* Herbert[4] has reported that inactivation by ethyl alcohol provides a specific test for prostatic acid phosphatase in sera free from hæmolysis. She found this procedure useful in the interpretation of elevated values in the range met with in both metastasizing prostatic carcinoma and non-prostatic diseases. We have confirmed her findings in cases with marked elevations of serum acid phosphatase but our experience to date with cases showing values of 5 to 8 units is limited. The results of our study of Herbert's inactivation technique will form the subject of a later report.

SUMMARY

The principles underlying the use of estimation of serum acid phosphatase as an aid to the diagnosis of metastasizing prostatic carcinoma are briefly reviewed. An assessment of the diagnostic value of this test based on our experience with the Gutman technique is presented. In the analysis and discussion of our data, special attention has been paid to definition of normal standards and interpretation of slightly elevated values.

The authors wish to express their obligations to Dr. F. S. Patch, Consulting Urologist, Dr. R. E. Powell, Director of the Department of Urology and the many other members of the staff of the Montreal General Hospital, who assisted us in the selection of cases and permitted us to make full use of their clinical material. Grateful acknowledgment is also due to Mrs. Francise Manktelow and Miss Grace Mountford who performed with great care the laborious task of collecting information from the clinical records.

REFERENCES

1. HERGER, C. C. AND SAUER, H. R.: *J. Urol.*, **46**: 286, 1941.
2. SULLIVAN, T. J., GUTMAN, E. B. AND GUTMAN, A. B.: *J. Urol.*, **48**: 426, 1942.
3. GUTMAN, A. B.: *J. Am. M. Ass.*, **120**: 1112, 1942.
4. HERBERT, F. K.: *Quart. J. Med.*, **39**: 221, 1946.
5. WOODARD, H. Q. AND DEAN, A. L.: *J. Urol.*, **57**: 158, 1947.
6. WOODARD, H. Q.: *New York State J. Med.*, **47**: 379, 1947.
7. GUTMAN, E. B. AND GUTMAN, A. B.: *J. Biol. Chem.*, **136**: 201, 1940.
8. *Idem*: *Proc. Soc. Exp. Biol. & Med.*, **47**: 513, 1941.
9. BENOTTI, J., ROSENBERG, L. AND DEWEY, B.: *J. Lab. & Clin. Med.*, **31**: 357, 1946.
10. GUTMAN, A. B. AND GUTMAN, E. B.: *Proc. Soc. Exp. Biol. & Med.*, **38**: 470, 1938.
11. WATKINSON, J. M., DELORY, G. E., KING, E. J. AND HADDOW, A.: *Brit. M. J.*, **2**: 492, 1944.
12. HUGGINS, C. AND HODGES, C. V.: *Cancer Research*, **1**: 293, 1941.
13. KING, E. J. AND ARMSTRONG, A. R.: *Canad. M. A. J.*, **31**: 376, 1934.
14. HERGER, C. C. AND SAUER, H. R.: *Cancer Research*, **2**: 398, 1942.

In times of change there is need for wisdom both in the external social order and within the profession. Spokesmen who loudly proclaim measures based on self-interest will not be tolerated. A hold-fast in Science is essential, but this represents only a part of the strength of Surgery. By maintaining the ancient bond with humanity itself through Charity—the desire to relieve suffering for its own sake—Surgery need not fear change if civilization itself survives.—E. D. Churchill, *Ann. Surg.*, **126**: 396, 1947.

OBSCURE CAUSES OF HEART FAILURE*

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THE object of this paper is to review causes of congestive heart failure in which etiological diagnosis may be difficult. Rare causes in which the primary condition is usually easily recognized are omitted, *e.g.*, arterio-venous aneurysm, thoracic deformities, scleroderma, acromegaly, lupus erythematosus disseminata, glomerulonephritis and eclampsia with or without hypertension, hæmochromatosis. For the same reason the following common diseases are omitted: rheumatic, congenital and syphilitic heart disease. Von Gierke's disease, Boeck's sarcoid, Paget's disease and cardiac tumour are omitted because of their rarity.

Frequently the cause of congestive heart failure is not apparent on the initial examination. Murmurs may be difficult to hear due to cardiac irregularity, tachycardia and feeble pulsation. The patient may be too ill to undergo fluoroscopy which would show diagnostic enlargements, *e.g.*, pulmonary artery, left auricle and right ventricle in mitral stenosis. In mitral disease, even if the diagnostic apical diastolic rumble cannot be heard, the loud reduplicated pulmonary second sound and the sharp apical first sound are useful signs.

In hypertensive congestive failure there is frequently a drop in systolic pressure and sometimes in both systolic and diastolic pressure to normal levels. Signs of left ventricular failure such as cardiac asthma, pulsus alternans, gallop rhythm, or cardiographic left ventricular strain may give the clue. The heaving apex beat and the big left ventricle on x-ray examination also point to aortic disease or hypertension. Arterial thickening and venous nicking in the fundi are distinctive of hypertension. Youthful hypertensives should always have femoral artery pulsations checked. If these are feeble an x-ray of chest will show scalloped rib edges characteristic of coarctation of the aorta.

Painless coronary occlusion. — Congestive failure in elderly patients is often called arteriosclerotic. This vague term should not be used without an attempt to make the diagnosis more specific. Former hypertension, thyroid dysfunction, valvular disease and avitaminosis should be eliminated as far as possible. Let us suppose the essential cause in a particular case is coronary atheroma. It is more descriptive to say "former angina pectoris; former posterior cardiac infarct; recent painless cardiac infarct followed by congestive failure". To read such a diagnosis is to agree with it. To read "arteriosclerotic heart failure" is to wonder whether a mistake has been made; 15% of 100 cases of coronary occlusion diagnosed by Stroud,[1] were painless. In Davis'[2] series of 76 cases of coronary thrombosis coming to post mortem, 29 gave a history of no pain.

Coronary occlusion was diagnosed at autopsy in 100 cases at the Winnipeg General Hospital between April, 1944 and December, 1946; 21% had congestive heart failure, 7% gave a history of no pain, and 5% had painless failure. It will be noted that 54% were dead on arrival, and several other patients also gave no history owing to their mental condition. Most figures on the mortality of coronary occlusion omit the large number of patients who died before they could be admitted to hospital.

TABLE I.

100 AUTOPSIES CORONARY OCCLUSION, WINNIPEG GENERAL HOSPITAL, APRIL, 1944 TO DECEMBER, 1946

Ages	*Males*	*Females*	*Total*
30 to 39	3	1	4
40 to 49	10	0	10
50 to 59	22	2	24
60 to 69	38	6	44
70 to 79	9	4	13
80 to 90	4	1	5
Total	86	14	100
Heart weights.			
under 400 gm.	42	7	49
400 to 500 gm.	18	4	22
over 500 gm.	26	3	29
Dead on arrival	48	6	54
Congestive heart failure	16	5	21
Painless	4	3	7
Painless failure	3	2	5
Obesity	21	8	29
Postoperative	1	2	3
Post-accident	1	0	1

The symptoms of painless coronary occlusion may be syncope, dyspnœa, œdema of the lungs, vomiting with ashen pallor. Usually one or more cardiographs will establish the diagnosis. Congestive failure, with or without auricular fibrillation or other arrhythmia may follow. The failure may clear as the infarct heals or it may become chronic. Probably many unexplained attacks of fibrillation in elderly patients are due to minute infarcts in an auricle or ventricle.

* Read at the Seventy-eighth Annual Meeting of the Canadian Medical Association, Section of Medicine, Winnipeg, June 25, 1947.

The sedimentation rate which is so useful in confirming a diagnosis of cardiac infarction 4 days or more after the attack, is usually not helpful in the presence of congestive failure, as the congested liver disturbs blood protein formation sufficiently to bring a high rate back to normal.[3]

Masked hyperthyroidism. — A serious diagnostic error in a case of heart failure is to fail to recognize a thyroid dysfunction, as treatment of the thyroid removes a causal factor. It was taught formerly that hyperthyroidism without other associated cardiac disease did not cause congestive failure. Likoff and Levine[4] in their series of 409 cases of thyrotoxicosis found failure in 5% who had no other cardiac disease except perhaps B deficiency; 19 out of 21 were females averaging 45 years of age. Average duration of thyrotoxicosis was 29 months and 8 out of 21 were fibrillating; 10% of their series had failure due to hyperthyroidism superimposed on hypertension, rheumatic heart disease or coronary disease.

An obvious case presents no diagnostic problem, but there are some cases where acute observation is needed, particularly if the patient already has hypertension or some other disease which can be blamed for the failure. The first rule is to suspect every case of fibrillation. Enquiry should be made for nervousness, loss of weight, heat intolerance, increase of bowel action. Suggestive signs are those relating to the eyes, generalized pigmentation, tremor, tachycardia, high pulse pressure, and hot moist hands and feet. The latter is a striking finding, particularly in old persons. Conversely cold blue extremities rule out hyperthyroidism.[5] Fluoroscopy shows a ham-shaped heart with a straight left border, due to prominence of the pulmonary artery and the left ventricle.

When the failure has been controlled by digitalis, in larger doses than usual, the rapid circulation time, high basal metabolic rate and low blood cholesterol will provide laboratory evidence. Finally a therapeutic test can be done with propyl-thiouracil.

Myxœdema heart.—The diagnosis of myxœdema heart is made by enquiring for lassitude, cold intolerance, vague muscle or joint pains, and by finding typical facies, dry skin, anæmia, bradycardia, generalized cardiac enlargement on x-ray and low voltage on the cardiogram. In the presence of failure the basal metabolic rate will be inaccurate but the blood cholesterol is usually well above the normal figures of 130 to 200 mgm. %. The circulation time is still prolonged after the failure has been cleared by digitalis. Thyroid should be started at 1/20 grain daily, as rapid administration of thyroid is very apt to lead to coronary symptoms and death.[6]

Beri-beri heart.—The sheet anchor in diagnosis of beri-beri heart is a history of poor diet for several months. The commonest causes of severe thiamin deficiency on this continent are alcoholic anorexia, dieting, and gastro-intestinal diseases which give vomiting or poor assimilation. There may be associated findings of B deficiency to aid in diagnosis, such as glossitis, cheilosis, lost jerks, tender calves, pellagrous pigmentation and diarrhœa. Hypoproteinemic œdema may also be present.

The cardiac syndrome from prolonged thiamin deficiency is that of congestive heart heart failure with rapid normal rhythm, cardiac dilatation, systolic murmur, and a gallop. The cardiogram typically shows low voltage with inversion of T_1. QT time may be lengthened. The circulation time is often not increased even in the presence of elevated venous pressure, thus giving warm extremities. Digitalis and salyrgan are often ineffectual; 50 to 100 mgm. of thiamin daily for 2 weeks will lead to recovery in about 60% of cases. In fatal cases the myocardium shows non-specific lesions such as hydropic degeneration, congestion and hæmorrhages[7] Lesions may also be found in the peripheral and autonomic nervous systems.

Chronic constrictive pericarditis. — Chronic constrictive pericarditis is rare but of great importance as operation can be curative. It should be considered in every case of failure not due to valvular disease or hypertension, particularly if the venous pressure is high, the blood pressure and pulse pressure low and the cardiogram shows low voltage of QRS with flat or inverted T waves. Usually there is marked ascites with little œdema of the legs. Special x-ray plates may show calcification of the pericardium. Diminution of the pulse on inspiration, known as pulsus paradoxicus, is a useful confirmatory sign.

Paroxysmal auricular tachycardia. — Paroxysmal auricular tachycardia in adults leads to congestive failure in 1% of cases and in most failure cases organic cardiac disease is also

present. But in infancy congestive failure following paroxysmal tachycardia is common. The observant mother will note dyspnœa and cyanosis. Vomiting is common and may lead to an erroneous diagnosis of gastro-intestinal upset. On examination the neck veins are engorged and the liver much enlarged. Œdema is rarely seen. The heart is regular and the rate from 200 to 300. Digitalization is the most successful therapy[8] and may need to be given parenterally if vomiting is present, *e.g.*, 2 to 3 c.c. digifoline intramuscularly.

Fiedler's non-specific myocarditis.—Fiedler's non-specific myocarditis[9] may follow respiratory infections, influenza A, gonorrhœa, mononucleosis, typhus. Attention may be drawn to the heart by dyspnœa, palpitation or precordial discomfort. Tachycardia with gallop rhythm and arrhythmia are common. Cardiograph may show PR prolongation and T inversion. The sedimentation rate is increased. Fever and leucocytosis may or may not be present. Most cases recover, some die suddenly during effort, and some go on to congestive failure. The latter often have intraventricular parietal thrombi which may give peripheral or pulmonary embolism. This may lead to confusion with a silent coronary occlusion. The other condition commonly mistaken for Fiedler's myocarditis is rheumatic carditis. At post mortem the heart weighs from 400 to 700 gm. The myocardium is infiltrated with lymphocytes, plasma cells and polymorphs.

Primary systemic amyloidosis. — Forty-five cases of this condition have been recorded,[10] 23 of whom had congestive failure with cardiac amyloid deposits. Diagnosis in life was usually based on skin lesions described as nodular, opalescent or sclerodermic. Gastro-intestinal, arthritic or upper respiratory tract symptoms may appear. Macroglossia may be present. Lymph nodes may enlarge. Special biopsy stains and intravenous Congo red may help establish the diagnosis. Low voltage was seen on the cardiograph tracings of 6 out of 12 cases.

FATAL RELAPSING PAROXYSMAL TACHYCARDIA IN AN INFANT

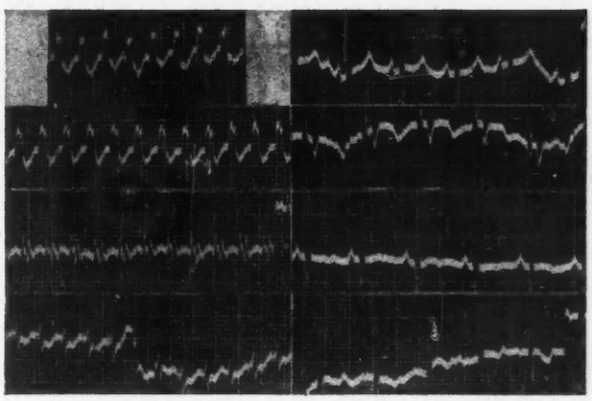
A female infant of 10 weeks had a history of several attacks of vomiting, sweating, dyspnœa and cyanosis in the previous six weeks, lasting from a few hours to two days. The current attack had lasted for a week.

On examination in July, 1943: weight 11 lb. 2 oz. Slight cyanosis. Afebrile. Respiratory rate 80. Heart rate very rapid and regular. Neck veins distended ½" above the sternal notch. Liver 3 fingers. X-ray showed heart slightly enlarged with hilar congestion. Cardiograph showed supraventricular paroxysmal tachycardia at 290. Blood count and urine negative.

After 3 grains of digitalis orally over 3 days the heart rate fell to 144 and the liver shrank to 1 finger. Digitalis was reduced to ½ grain daily. Next day rate was 240, again falling to 136 in 12 hours after another grain of digitalis.

Child was well for 18 days then readmitted in another attack with more severe vomiting and cyanosis. After prostigmine injections of 15 minims in 2 hours the rate fell from 290 to 220. Rectal digitalis was expelled. Finally oral digitalis was retained and after 4½ grains in 12 hours 8 hours later the rate was 144. An attempt at prevention of attacks was made by giving one drachm of ½% pontocaine rectally followed by gr. 1 of quinidine in water thrice daily. Injections were given by an eye dropper attached to a small catheter. On this regimen the child remained well for three weeks.

In the next attack ¼ tablet prostigmin orally had no effect, and ergotamine tartrate 0.05 mgm. was tried subcutaneously. Rate fell over a period of three hours from 200 to 150 and rose to 200 nine hours later. Mecholyl 1.2 mgm. was given subcutaneously when the rate had risen to 260. In 10 minutes the infant broke into a profuse sweat, salivated, flushed, had laboured respirations and a bowel movement. The rate remained



July 5, 1943 September 5, 1943

Fig. 1.—Fatal relapsing paroxysmal tachycardia in an infant.

unchanged. Some hours later a dose of 1.8 mgm. had similar results. Three grains of digitalis given orally in 14 hours; 43 hours later rate fell to 160 and later to 112 with a normal cardiogram.

Three days later attack recurred; 1½ c.c. 15% magnesium sulphate intravenously was followed by a drop in rate from 268 to 216 in 25 minutes with later climb of rate to 256. Oxygen tent with 2 litres per minute had no effect on colour or heart rate. This attack ended spontaneously after 16 days. At this time child developed purpura blood stained vomitus and stool. Blood count normal. Purpura faded and did not recur after 1 c.c. vitamin K subcutaneously. Weight 10 lb. 11 oz. Prophylactic quinidine increased to gr. 1½ thrice daily and later gr. 2 thrice daily. Free of attacks for one month and weight rose to 12 lb. 12 oz.

On the sixth and last admission, heart rate 220 to 260 for one week. Cyanosis cleared and condition fair until temperature appeared on the seventh day gradually rising to 103.6 with respiratory rate of 100, cyanosis, vomiting and hiccoughing. Child died next day, aged six months.

Post mortem four hours after death. Slight œdema feet. Liver 284 gm. (normal 188), firm and pale; focal fatty degeneration. Lungs soggy. Heart 74 gm. (normal 29), enlarged and firm. Right auricle dilated. Valves normal. No congenital defects. A few petechiæ were seen under the visceral pericardium. Microscopic sections normal.

Many reports of single attacks have been published. Most responded to 1½ cat units of digitalis (2¼ grains) Hobbs[11] reports one case with 7 attacks in 17 days. In retrospect it appears that a maintenance dose of digitalis should have been given in my case.

Fatal Case of Beri-beri Heart with Hypothyroidism

A newly married housewife of 21 who had undergone an unsupervised prenuptial fast five months previously (in 1942) in which she had lost 12 lb. the first two weeks and a total of 24 lb. in 6 weeks, reducing from 175 lb. to 151 lb. She stopped dieting when she noted dyspnœa, palpitation and fainting on stairs with occasional numbness and tingling in her feet. A dry cough had been troublesome for a week.

On examination.—No signs of heart failure except dyspnœa. Pulse 100, regular. Blood pressure 105/70. Pulmonary second sound accentuated. Gallop rhythm. No murmurs. Calves tender. Leg jerks normal. Fluoroscopic showed slight general enlargement of heart with slight hilar congestion. No enlargement of pulmonary artery or of left auricle (barium in œsophagus). Cardiograph showed right axis deviation and flat T_2 W.R., sedimentation rate, urine and hæmoglobin, normal. Temperature 96.6°, weight 156 lb.

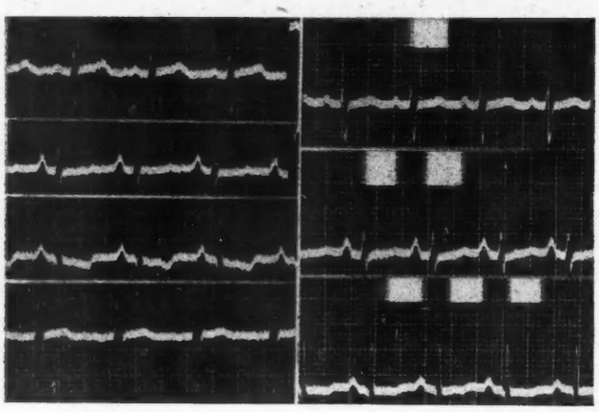


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Fig. 2.—Beri-beri with hypothyroidism.

After a week in hospital on 15 mgm. thiamin daily by injection she felt much better and insisted on going home. Basal metabolic rate minus 21. Discharged on thiamin 10 mgm. daily. Two weeks later she reported great irritation of throat causing excessive cough. Dyspnœa not noted, but cardiac signs and cardiograph unchanged. At this time she was put on thyroid gr. ½ daily increasing in one week to gr. 1 daily. Nine days after starting thyroid she was readmitted to hospital with œdema, orthopnœa, and great distress from irritation in the larynx causing excessive cough, unrelieved by menthol, benzocaine or heroin. Laryngoscopy negative. Œdema disappeared overnight but pulse remained at 96 to 120 regular. Blood pressure 100/90. Given B complex by injection containing thiamin 20 mgm. daily plus 2 mgm. five times daily orally. Six days later when *in extremis* rapid digitalization was tried and failed.

Post mortem 36 hours after death showed some excess fluid in all serous cavities. Heart 330 gm. Liver 1,750 gm.; nutmeg appearance. A few epicardial and mesenteric petechiæ were seen. Mitral and tricuspid valves showed slight thickening and mucoid œdema. Chordæ tendineæ normal. Sections showed hydropic degeneration of heart muscles with fibres separated by œdema, edges blurred, some loss of cross striation and some fragmentation. Larynx showed slight thickening of vocal cords.

Exhaustion from the laryngeal irritation was a major factor in the fatal termination. If this case were being treated at the present time she would have received at least 100 mgm. thiamin daily in injection plus oral B complex. Thyroid should have been withheld until the cardiac symptoms had disappeared.

Hyperthyroidism and Hypertension

A woman of 65 who had been treated by several physicians for one year for hypertension with recurring attacks of fibrillation leading to congestive heart failure. Symptoms included weakness, nervousness, tachycardia, heat intolerance and loss of 10 lb.

On examination.—Her eyes were too bright but showed no exophthalmos or lid lag. Some pigmentation of trunk. Hands and feet, hot and moist. Small adenoma of thyroid. Little tremor. No congestive failure. Apex 5/4". Pulse 82 regular. Pulmonary systolic murmur with the slight pulmonary exocardial sound resembling a rub which is frequently heard over the enlarged pulmonary artery of hyperthyroidism. Blood pressure 180/85. X-ray of heart showed minimal enlargement with a slightly prominent pulmonary artery. Basal metabolic rate plus 49.

Thiouracil relieved her symptoms in a month, with a gain of 9 lb. in weight. Sixteen months later her doctor sent her back again as she had developed symptoms of myxœdema, low voltage QRS complexes, low voltage T_1 and blood pressure 205/105. Her thiouracil was stopped and her symptoms cleared in a month.

Congestive Failure with Avitaminosis and Anæmia

Retired female hospital cook aged 74 who had been living alone on a diet largely composed of liquids and carbohydrates. Admitted to hospital two weeks after onset of dyspnœa and slight œdema. Preceding history of weakness, anorexia and loss of weight. She had had some digitalis for three days before admission.

On examination.—She was tall, very emaciated and pale, with some yellow brown pigmentation of the face and trunk. Tongue shiny and pale. Koilonychia. Tender calves. Absent ankle jerks. Neck veins distended 2" above the sternal notch. Liver 5 fingers. Pitting œdema of ankles and sacrum. Heart rate 102, irregular. Apex 6/3½". Blood pressure 120/82. Cardiograph showed fibrillation. No axis deviation. QRS voltage in limb leads 2.5 mm., 1 mm., 3 mm. T waves quite flat. Digitalis effect in ST_4. X-ray showed slight general enlargement of heart and hilar congestion. X-ray of stomach and barium enema negative. Blood proteins normal. Blood cholesterol 187. Hg. 44%, red blood cells 4.5 million. Urine 1.031, negative, micro negative.

Treatment.—With digitalis and two injections of salyrgran, weight fell from 96 to 74 in two weeks. B complex preparation orally and by injection gave 7.5 mgm. thiamin daily. Ferrous sulphate and a high caloric liquid and semi-solid diet were given. Five weeks after admission basal metabolic rate was plus 6.

On discharge three months after admission hæmoglobin had risen to 65% and weight to 79 lbs. Cardiograph now showed fibrillation at 76, left axis deviation with QRS voltage of 4 mm., 5 mm., and 7 mm. and better T waves. Calf tenderness gone: ankle jerks elicited. Follow up a month later showed further improvement in weight, strength and hæmoglobin.

References

1. Stroud, W. D.: *Kentucky M. J.*, **43**: 174, 1945.
2. Davis, N. S.: *J. Am. M. Ass.*, **98**: 1806, 1932.
3. Wood, P.: *Quart. J. Med.*, **5**: 1, 1936.
4. Likoff, W. B. and Levine, S. A.: *Am. J. M. Sc.*, **206**: 425, 1943.
5. Ravin, A.: *Ann. Int. Med.*, **15**: 478, 1941.

6. MCGAVACK, T. H., LANGE, K. AND SCHWIMMER, D.: *Am. Heart J.*, 29: 421, 1945.
7. BLANKENHORN, M. A.: *Ann. Int. Med.*, 23: 398, 1945.
BLANKENHORN, M. A., *et al.*: *J. Am. M. Ass.*, 131: 717, 1946.
8. HUBBARD, J. P.: *Am. J. Dis. Child.*, 61: 687, 1941.
9. CANDEL, S. AND WHEELOCK, M. C.: *Ann. Int. Med.*, 23: 309, 1945.
SAPHIR, O.: *Am. Heart J.*, 24: 167, 1942.
BAILEY, F. R. AND ANDERSON, D. H.: *Am. Heart J.*, 6: 338, 1931.
VON BONSDORFF, B.: *Acta Med. Scand.*, 100: 320, 1939.
10. LINDSAY, S.: *Am. Heart J.*, 32: 419, 1946.
11. HOBBS, L. F.: *Am. Heart J.*, 21: 804, 1941.

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RÉSUMÉ

Revue de quelques causes mal connues de décompensation cardiaque. L'occlusion indolore des coronaires,—qui est souvent un diagnostic d'autopsie,—est frequemment suivie d'hyposystolie. L'hyperthyroidie et le myœdème peuvent parfois amener la défaillance cardiaque si ces états ne sont pas reconnus à temps et traités étiologiquement. Le béribéri est plus rarement responsable de cardiopathies en ces temps de vitaminothérapie intensive. La symphyse du péricarde produit rapidement des symptômes de cardiopathie. Dans 1% des cas la tachycardie auriculaire paroxystique conduit à l'asystolie. La myocardite de Fiedler est une autre cause, assez rare, de défaillance cardiaque. Il en est de même de l'amyloidose. Quelques cas bien choisis illustrent le texte précédent.

JEAN SAUCIER

THE DIAGNOSIS AND TREATMENT OF MENIERE'S SYMPTOM COMPLEX*

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THE purpose of this paper is an attempt to correlate the present knowledge of the symptom-complex of recurrent attacks of rotary vertigo accompanied by tinnitus and deafness. This syndrome will always bear the name of Ménière in spite of the fact that many authors think it is an unfortunate name to be applied. This is due to the fact that Ménière's original case, with the post mortem findings described, was probably a hæmorrhage into the labyrinth with an acute destruction of this organ. Atkinson states that Ménière's disease should be a discarded term in our teaching and that "hydrops of the labyrinth" should be substituted. By whatever name we wish to call it, this condition is a real problem to the patient and also to the otologist to whom these cases usually first appeal for help.

In the past seventeen years I have been interested in this type of case and have been in close co-operation with the neurologist and the neuro-surgeon in its treatment. In this paper I would like to review what we have found to be the important symptoms and diagnostic findings and to discuss critically the results we have obtained from the surgical resection of the eighth nerve, as advised by Crowe and McKenzie and Dandy, and the destruction of the labyrinth as performed by Hallpike and Cawthorne. The various methods of medical treatment will also be discussed.

In our series of cases in Toronto I would like to report 168 cases admitted to the Toronto General Hospital of which 90 had resection of the eighth nerve and 2 only had destruction of the labyrinth. I would also like to report 31 cases operated on at St. Michael's Hospital by destruction of the labyrinth.

PATHOLOGY

The endolymphatic space is a closed fluid system. The endolymphatic fluid is secreted by the stria-vascularis and its absorption is probably from the loose stroma around the closed saccus endolymphaticus which is continuous with this system. The membranous system is surrounded within the confines of the bony labyrinth by the perilymphatic space which is filled with the perilymph fluid. This fluid is identical with spinal fluid and connects directly with the large subarachnoid spaces through the cochlear aqueduct. The theoretical lesion is one in which there is an enormous dilatation of the membranous labyrinth by an increased volume of the endolymphatic fluid. This results in an almost complete filling of the bony capsule except at the helicotrema. At this point there is a bulging through of Reissner's membrane into the scala tympani. When this blockage and increased tension occurs the whole fluid system becomes extremely sensitive and explosive attacks may result from minute stimuli.

This so called "hydropa?" was noted first in the autopsies reported by Hallpike and Cairns and found also in subsequent autopsy specimens of the labyrinth by other authors. The cause of this increase in fluid volume, whether by an increase of secretion or lack of absorption of the endolymph, is still a matter of conjecture. Most medical treatment is based on an attempt at the control of the volume of the endolymph.

ETIOLOGY AND OTHER ASPECTS

To maintain balance three main sources of information reach the cerebral cortex. These are: (1) Proprioceptive impulses from joints, muscles and ligaments; (2) visual sensations from the eyes; and (3) impulses from the labyrinth. In order that the messages from the inner ear can be properly interpreted there must be a fine balance between the system of each ear. Vertigo is an imbalance or discord of impulses arriving at a normal centre from some lesion affecting the peripheral end-organ. Imbalanced nerve impulses causing vertigo may arise in the semicircular canals, in response to quick movements and changes in position, or in the utricule in response to the static position of the body in space. The mechanism on both sides must be normal to obtain the proper gyro-

* Read at the Canadian Medical Association Meeting, June, 1947.

scopic effect necessary for balance. If one vestibular apparatus is hypotonic or hypertonic, the sensation interpreted by the cortex is imbalance, and vertigo results. Deafness results from an accompanying lesion of the cochlea, as probably does also the still elusive tinnitus.

Ménière's syndrome, in its characteristic form, presents typical recurrent attacks of acute vertigo, tinnitus and decrease in hearing. The first symptom is usually a sudden onset of violent vertigo, but it may begin with unilateral deafness or tinnitus. The auditory symptoms may precede the vertiginous attacks by a considerable period.

The attack is usually preceded by some sort of aura. There may be an increase in the tinnitus, increasing deafness or just a fullness in the head. A major attack is characterized by severe vertigo, nausea with vomiting present at times. The patient is pale, clammy and lies quite still, terrified that the slightest movement may accentuate the vertigo. The duration may be minutes to many hours. Recovery is rapid but with some persisting unsteadiness. Occasionally mild, persistent vertigo occurs between the major crises.

VERTIGO

The vertigo is characteristically of the "rotation" type. It is objective in nature and the patient can usually describe whether objects rotate in a clockwise or contra-clockwise direction. The direction of falling or staggering is usually constant.

The tinnitus may have any characteristic type of sound and may precede all other symptoms. It unfortunately does persist after the resection of the eighth nerve or destruction of the labyrinth in about 50% of cases.

Loss of cochlear function can be observed in all cases of Ménière's. Cawthorne found it to be bilateral in 86% of his cases. The hearing is more affected in one ear than the other, indicating the disease affects one ear well in advance of the other.

DIAGNOSIS

The diagnosis of Ménière's is based largely on the history. Spontaneous signs of falling in the exaggerated Romberg position with one foot ahead of the other can be tried. Past pointing with eyes closed may be present. Nystagmus is rarely present except during an attack. This is constant with any change of position of the head. The other cranial nerves with general tests for co-ordination should be checked to rule out cerebellar or cerebellar-pontine angle tumour.

An imbalance in the "minimal ice water stimulus" tests of either Kobrac or Atkinson is important. The hot and cold tests of Fitzgerald and Hallpike with temperature above and below the patient's normal temperature (usually 30 and 44° C.), produce more accurate results and a finer discrimination. The importance of knowing which ear is the abnormal one from a viewpoint of proposed surgery is obvious. The caloric test showing one labyrinth with a deviation from a normal response is of great value in this localization. The side with the greatest deafness or tinnitus, with the history of falling in this direction, and the spontaneous signs of past pointing to the same side and nystagmus to the opposite side, help to confirm the final localization.

This is not in any way a fatal disease and all the pathological changes are within the labyrinth, but it can by its persistence and the violence of the attacks reduce the patient to chronic invalidism. The nervous temperament of even the most robust is strained by the mental and physical upsets of the recurrent attacks. Sympathy, encouragement and careful rehabilitation supervision are necessary. Tinnitus often persists in spite of any treatment. The prognosis regarding the cessation of the vertiginous attacks by one or other method of treatment is good. The tendency to spontaneous remission must be kept in mind in regard to the assessment of all treatment. Many cases, even those untreated, seem to run a self-limited course with permanent cessation of all attacks of vertigo.

TREATMENT

Many types of treatment have been postulated indicating probably that none has been too satisfactory. These may be divided into the two types of medical and surgical treatment. I would question the statement of Crowe and Dandy that the only really satisfactory method of treatment is resection of the eighth nerve. Surgical treatment is not an absolute assurance of permanent relief of all symptoms. It should be attempted only after the patient's complaints become unbearable and all medical measures have failed.

Medical treatment.—The patient is greatly in need of reassurance, as he probably believes he

has a brain tumour or some other intractable and fatal intracranial disease. He must be reassured that there is every chance that gradually, and with reasonable certainty, his vertigo can be overcome. A good deal of his discomfort is a profound mental insecurity and sedation is necessary. One of the barbiturates is the most useful drug although hyoscine is perhaps more specific and more effective.

All medical treatments are attempts to control the "hydrops" or the increased fluid pressure level within the membranous labyrinth. Histamine and nicotinic acid, as advocated by Atkinson, probably act directly on the vessel walls in the absorption area in the region of the endolymphatic sac. Atkinson's desensitization theory of histamine has not been reduplicated or generally accepted. The Furstenberg treatment with its modifications are attempts to reduce the endolymphatic pressure by varying the body water-balance. The sodium ion is supposedly the offending ogre and this is eliminated largely by a strict, salt-free diet and the substitution of gr. 7½ or gr. 15 of potassium chloride, ammonium chloride or potassium nitrate, three times daily. It has been suggested that these added salts have their effect only by their diuretic action. The limiting of fluid intake is also essential. This need not be to less than two pints daily.

The technique of nicotinic acid and histamine injection will not be given in this paper. I do think, however, that we cannot ignore the experimental work which has produced peptic ulcer with the use of histamine.

There have been enough cases reported to have been relieved (Wright, Walsh and Adson) by removal of foci of infection that this procedure can not be ignored whether the toxic labyrinthitis differs technically from Ménière's or not. Food allergy must also be considered from the reports of Atkinson and Shambaugh Jr. These are not the easy, skin test variety, but are usually elicited by careful history and personal observation by the patient. Atkinson's case that was relieved by stopping excessive milk consumption and initiated later by eating cream cheese must be remembered.

Surgical treatment.—The surgical treatment is an attempt to prevent completely the distorted impulses from getting to the cortex with the hope that re-education and so-called compensation will remove the sensation of imbalance. This will then require more dependence on the impulses received from the eyes and the proprioceptive messages as well as the re-education for reception of impulses from the remaining normal labyrinth. In time it is hoped that no discord will be present and the physiology of balance will be restored to its normal state.

Resection of the eighth nerve.—This is an operation of little risk in the hands of a competent neuro-surgeon. An attempt may be made to resect the vestibular fibres only, but a certain number of cases have been reported with distortion of hearing that is more troublesome than complete deafness. This complaint has not come to our attention. After compensation has occurred, the main symptom of vertigo is relieved. Tinnitus does persist in a fair number of cases. Also we must remember that Ménière's is probably a bilateral disease and may recur from the other side. I saw recently a patient with an eighth nerve resection in 1935. He has had ten years of complete freedom from vertigo, then two years of minor attacks. He now has severe attacks that are easily localized in his unoperated ear.

Destruction of the labyrinth.—This method is strongly advocated by Hallpike and Cawthorne. With present antibiotics and the full use of chemotherapy it should be a relatively simple procedure for the well-trained otologist. There was one death from cerebellar abscess in our series in Toronto. All that is necessary is the opening of the semicircular canals with picking up of the membranous labyrinth and the application of diathermy. These patients have complete loss of hearing function following operation. We have done 33 of these cases in Toronto. The surgeon trained in fenestration surgery is best suited for this type of operation which should be done under magnification. Thirty-one of these cases were done at St. Michael's Hospital by Dr. Sullivan.

I do feel that destruction of the labyrinth as a method of treatment has excellent possibilities when surgery becomes necessary. It must be remembered that operative interference is required only in about 10% of all cases treated.

RESULTS OF TREATMENT

In the Toronto General Hospital I find it difficult to assess from our records the permanent results of the various medical procedures.

This is due to the fact that most patients receive their treatment through the Outdoor Service. There is no doubt about the remission of symptoms from the use of luminol and the regimen of the limitation of fluid intake and salt in the diet. The substitution of the sodium ion with either potassium or ammonium chloride may be an added factor. Histamine and nicotinic acid have not produced satisfactory results, but perhaps we have used them in too haphazard a manner. A small series treated systematically by my predecessor, Dr. Angus Campbell, did seem quite promising.

The surgical procedure of choice has been resection of the vestibular portion of the eighth nerve. The records and subsequent "follow-up" on this operation by Dr. K. G. McKenzie's Neuro-surgical Service are excellent. I would like to point out that while Dandy was the first to completely resect the eighth nerve for this malady, Dr. McKenzie was the first to divide the vestibular portion and attempt to leave the cochlear fibres still intact. He does not subscribe to the reports of other authors that hear-

TABLE I.

RESULTS OF VARIOUS MEDICAL TREATMENTS (AFTER ATKINSON)

Author treatment	*No. cases*	*relieved*	*Vertigo improved*	*total*	*Deafness improved*	*Tinnitus improved*
Mygrind & Dederling (salt free diet, dehydration)	157	43%	52%	95%	17.4%	not stated
Furstenberg (Na. free diet & Amm. chloride)	35	57%	26%	83%	9%	51%
Walsh & Adson (low salt & Amm. Chl. or Potas. nitrate)	152	34%	28%	62%	28%	same as deafness
Talbott & Brown (high Potas. diet)	27	0%	96% "no acute attacks"	96%	not stated	"some"
Lillie, Horton & Thornell (histamine intravenously)	25	60%	24%	84%	48%	56%
Atkinson (nicotinic acid)	110	38%	46%	84%	23%	52%
Atkinson (histamine desensitization)	21	76%	14%	90%	24%	38%

(*Arch. Neuro. & Psych.*: **54**: 192, 1945.)

TABLE II.

RESULTS OF VARIOUS SURGICAL TREATMENTS (AFTER ATKINSON)

Author treatment	*No. cases*	*relieved*	*Vertigo improved*	*total*	*Deafness improved*	*Tinnitus improved*
Operations on eighth nerve, Coleman and Lyerly	10	100%	.....	100%	0%	100%
Crowe	72	100%	.....	100%	19.5%	not stated
Walsh and Adson	20	65%	30%	95%	not stated	not stated
Operations on labyrinth, Mollison	50	74%	16%	90%	not stated	not stated
Cawthorne and Hallpike	50	....	92%	92%	22%	44%
Day	8	75%	....	75%	12.5%	75%
Portmann operation on saccus endolymphaticus, Woodman	11	73%	9%	82%	5.5%	3%
Waltner	11	72%	9%	81%	45%	18%
Removal of foci of infection, Wright	84	83%	5%	88%	70%	59%

(*Arch. Neuro. & Psych.*, **54**: 194, 1945.)

ing distortion occurs following the partial resection of this nerve. The hearing in many cases is unchanged.

The destruction of the membranous labyrinth has been a more recent procedure in our school. We have had only two cases at the Toronto General Hospital. The great amount of this work in Toronto has been done by Dr. J. A. Sullivan. The cases I have seen, who have had this operation, seem to present almost equally good post-operative findings as those treated by the surgical resection procedure. They do have, however, complete loss of all hearing function in the operative ear.

TABLE III.

LOW AND RESTRICTED SALT AND FLUID DIET
(Cawthorne, T., *Annals*, **56:** 34, 1947)

1. Neither salt or soda to be used in cooking or at table.
2. The following foods must be avoided:

Bacon	Meat extracts	Bloaters
Ham	Gravy	Kippers
Corned beef	Tinned soups	Smoked fish
Salt beef	Marmite	Shell fish
Sausage meat	Tinned fish	Baked beans
Breakfast cereals	Bottled olives	Meat and Fish pastes

3. Cheese and salt butter should be taken sparingly.
4. Bread should be baked free from salt if possible.
5. Not more than 2½ pints of fluid should be taken in 24 hours.

TABLE IV.

SUMMARY OPERATIVE TREATMENT
(Cawthorne's series)

Saccus endolymphaticus incised		5
Labyrinthotomy		130
Alcohol injected	10	
Membranous canal diathermy	4	
Membranous canal incised	116	
Total Operations		135

(*Ann. Otol., Rhin. and Laryn.*, **56:** 35, 1947.)

TABLE V.

IMMEDIATE RESULT OF OPERATIVE TREATMENT
(Cawthorne's series)

Total operations		135
Healed by first intention	133	
Low grade infection with ear (Discharge for one week)	2	
Other complications (no deaths)	0	

(*Ann. Otol., Rhin. and Laryn.*, **56:** 35, 1947.)

TABLE VI.

LATE RESULTS OF OPERATIVE TREATMENT
(Cawthorne's series)

Total operations		135
Cochlear and vestibular function abolished	133	
Not abolished (two saccus cases)	2	
General state and ability to work:—		
a. Improved and able to work	120	
b. Not improved and unable to work	9	
c. No record	6	

(*Ann. Otol., Rhin. and Laryn.*, **56:** 35, 1947)

TABLE VII.

TORONTO, OPERATIVE TREATMENT
(Approximately 10% of all cases of Ménière's)

1. Resection of eighth nerve		90 cases
2. Destruction of labyrinth		33 cases
Toronto General Hospital	2	
St. Michael's Hospital	31	
Postoperative deaths		
Resection	1 case	
Labyrinthotomy	1 case	

TABLE VIII.

TORONTO, HISTAMINE TREATMENT
(Dr. A. A. Campbell)

Total patients	11
Immediate relief	9 cases
With no attacks for two years	2 cases
With no attacks for one year	3 cases
With no attacks for 6 months	2 cases
With no attacks for 4 to 6 months but mild relapses	4 cases

(*Canad. M. A. J.*, **52:** 605, 1945.)

CONCLUSIONS

1. The diagnosis and treatment of Ménière's symptom complex have been discussed.

2. Treatment by medical measures is certainly the first method of attack on this problem.

3. A relatively small proportion of the cases require surgical interference. This probably does not exceed 10% of the patients on which the diagnosis can be made. It is advised only when there are very severe, disabling attacks and there is a failure of response to medical measures.

4. A choice of two methods of surgical treatment is available. Resection of the vestibular fibres of the eighth nerve is excellent treatment when performed by a well-trained neuro-surgeon. Destruction of the labyrinth is perhaps equally effective, but this operation should be performed by an otologist familiar with minute ear surgery.

BIBLIOGRAPHY

1. ATKINSON, M.: *Canad. M. A. J.*, **42:** 326, 1940.
2. *Idem*: *Arch. Otolaryng.*, **42:** 186, 1945.
3. CAMPBELL, A. A.: *Canad. M. A. J.*, **52:** 605, 1945.
4. CAWTHORNE, T. E., FITZGERALD, G. AND HALLPIKE, C. S.: *Brain*, **65:** 161, 1942.
5. CAWTHORNE, T. E. AND HALLPIKE, C. S.: *Proc. Roy. Soc. Med.* (Sect. Otol.), **36:** 21, 1943.
6. CAWTHORNE, T. E.: *Ann. Otol. Rhin. Laryng.*, **56:** 18, 1947.
7. CROWE, S. J.: *Medicine*, **17:** 1, 1938.
8. HALLPIKE, C. S. AND CAIRNS, H.: *J. Laryng. & Otol.*, **53:** 625, 1938.
9. MCKENZIE, K. G.: *Trans. Acad. Med.*, Toronto, 1932.
10. MÉNIÈRE, P.: *Gazz. Med.*, Paris, **16:** 20, 1861.
11. WALSH, M. N. AND ADSON, A. W.: *J. Am. M. Ass.*, **114:** 130, 1940.

THE PLASMA PROTEINS IN HEART FAILURE*

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DESPITE the rapid strides which have been made in the study of the disturbances of protein balance in various diseases, the importance of an adequate protein intake in the treatment of congestive heart failure has not been generally appreciated. For example, the anasarca which is so characteristic of the nephrotic syndrome has been established as the result of hypo-proteinæmia due to massive albuminuria. The œdema of chronic malnutrition is correctly ascribed to plasma protein deficit resulting from insufficient protein intake. The œdema of cirrhosis of the liver is recognized to be the result of deficient synthesis of plasma protein by the damaged organ, and loss of protein into the ascitic fluid. Much has been done in elucidating the rôle of negative nitrogen balances in the prolongation of illness in many acute and chronic diseases.[1] And yet the significance of protein starvation in the production of cardiac œdema, while frequently mentioned in passing, has rarely received extended treatment in the literature.

The management of a case of congestive heart failure follows two general lines. First and foremost, the failing heart—the underlying basis of the condition—must be adequately treated. Great progress has been made along these lines, particularly in the investigation of the effects of the purified digitalis glycosides.[2] It should be pointed out, however, that the advantages of these purified products over whole-leaf preparations are not yet conceded by all observers. In addition to direct cardiac therapy, treatment is directed toward resolution of œdema by other methods, which may be classed as "auxiliary measures".

These include: (1) Management of fluid balance. In this connection Schemm[3] and others have stressed the importance of supplying sufficient fluid for metabolic requirements, even to the extent of forcing fluids when necessary. (2) Sodium restriction. Extended investigation has been carried out in this direction,[4] with the generally accepted conclusion that correction of sodium retention is a fundamental factor in the relief of cardiac œdema. (3) Diuretics. Of these, ammonium chloride and the newer mercurials have been deservedly the most popular, and recent observations by Gold[2] and his coworkers, have indicated that benefit may be expected from more extensive application of the latter drugs than has been customary in the past. (4) Diet. In this field, the low-calorie diets inherent in the Karrell[5] regimen have fallen somewhat into disrepute. In general, neutral or acid-ash diets are advised in an effort to restrict intake of base (*i.e.*, sodium) and, in general, less drastic measures are now invoked.

Nevertheless, despite the discredit which has fallen upon protein restriction in other diseases, it is difficult to find in the recent literature a single reference to the occurrence of protein starvation, and the value of high protein feeding in congestive heart failure.

It is the purpose of this paper to discuss the physiology of fluid interchange between capillaries and tissues; to demonstrate its relationship to the development of cardiac œdema; and to advocate the addition of the high-protein diet to our therapeutic weapons in the management of congestive heart failure.

FLUID EXCHANGE

A degree of familiarity with the dynamics of fluid exchange between capillaries and tissue spaces is necessary for a thorough understanding of the problem. It is recognized that such interchange is governed by four factors, *viz.*: (1) The hydrostatic pressure within the capillary lumen, which is dependent chiefly on the local venous pressure. (2) The hydrostatic pressure of the tissue fluids. (3) The osmotic pressure of the plasma, which is mainly dependent on the plasma proteins, the albumin fraction in particular. (4) The osmotic pressure of the tissue fluids.

Practically, a distinction must be made between the hydrostatic pressure at the arteriolar end, and that at the venous end of the capillary network. The average values for these relationships in health, are as follows:

1. Capillary hydrostatic pressure (arterial end) – 32 mm. Hg.
2. Capillary hydrostatic pressure (venous end) – 12 mm. Hg.

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3. Tissue fluid hydrostatic pressure – 8 mm. Hg.
4. Osmotic pressure of plasma – 26 mm. Hg.
5. Osmotic pressure of tissue fluids – 10 mm. Hg.

That is, the effective hydrostatic pressure at the arterial end (1) – (3) = 32 – 8
= 24 mm. Hg.

The effective hydrostatic pressure at the venous end (2) – (3) = 12 – 8
= 4 mm. Hg.

At this point, the osmotic pressures must be considered, and it will be obvious that,
The effective osmotic pressure (4) – (5) = 26 – 10 = 16 mm. Hg.

The final pressure-relationships are:
(*a*) At arterial end,
Effective hydrostatic pressure minus effective osmotic pressure = 24 – 16 = 8 mm. Hg.
That is, there is a force of 8 mm. Hg. in the direction of filtration of fluid from capillaries to tissues.
(*b*) At venous end,
Effective hydrostatic pressure minus effective osmotic pressure = 4 – 16 = – 12 mm. Hg.

That is, there is a force of 12 mm. Hg. in the direction of reabsorption of fluid from tissues to capillaries. These relationships have been well stated by Landis, as follows,

"The gradient of capillary pressure is balanced against the colloid osmotic pressure in such a way that, under average conditions, the filtration occurring in the arteriolar portion of the capillary network, is balanced by reabsorption in the venous capillaries and minute venules".

It follows that any agency bringing about either an increased capillary hydrostatic pressure, or a decreased plasma osmotic pressure—*or both*—will increase the tendency to filtration at the arterial end of the capillary, and diminish the tendency to reabsorption at the venous end, and thus lead to the accumulation of fluid in the tissues.

It is well recognized that congestive heart failure is a causative agency *par excellence* of increased venous pressure and consequently of increased capillary pressure, whether one subscribes to the classical "backward-failure" theory of congestive heart failure, or the "forward-failure" theory, as most recently propounded by Warren and Stead.[6]

The obverse of the coin—the frequent coexistence of plasma protein deficiency with congestive heart failure—will be pointed out in this paper; and the resulting diminution in plasma osmotic pressure will be demonstrated as a contributing agency in the development and maintenance of cardiac œdema.

It may be well to consider more specifically at this point the influence on fluid exchange of: (*a*) An increase in intracapillary hydrostatic pressure of 5 mm. Hg. (*b*) A decrease in plasma protein level of 2 grams per 100 c.c. (2%). (*c*) Both physiological disturbances.

(*A*) *Increase in capillary hydrostatic pressure.*—The following values will obtain:

1. Capillary hydrostatic pressure (arterial end) = 32 + 5 = 37 mm. Hg.
2. Capillary hydrostatic pressure (venous end) = 12 + 5 = 17 mm. Hg.
3. Tissue fluid hydrostatic pressure = 8 mm. Hg.
4. Plasma osmotic pressure = 26 mm. Hg.
5. Tissue fluid osmotic pressure = 10 mm. Hg.

Therefore:
Effective hydrostatic pressure (arterial end) = 37 – 8 = 29 mm. Hg.
Effective hydrostatic pressure (venous end) = 17 – 8 = 9 mm. Hg.
Effective osmotic pressure = 26 – 10 = 16

Thus, at arterial end, effective hydrostatic pressure minus effective osmotic pressure = 29 – 16 = 13 mm. Hg.

At venous end, effective hydrostatic pressure minus effective osmotic pressure = 9 – 16 = – 7 mm. Hg.

It is quite clear, then, that a rise of 5 mm. Hg. in venous pressure, will result in an increased transudation of fluid into the tissues from the arterial end of the capillary network, which is uncompensated by the lesser tendency to reabsorption at the venous end.

(*B*) *Decrease in plasma protein level of 2 gm. per 100 c.c. (2%).*—It can be demonstrated by calculation from the osmotic pressures exerted by 1 gm. of albumin and 1 gm. of globulin per 100 c.c., that a decrease in plasma protein content of this degree would produce a fall in plasma osmotic pressure of 6.5 mm. Hg. Assuming the normal plasma osmotic pressure to be 26 mm. Hg. the pressure under such conditions would be 19.5 mm. Hg.

By a similar arithmetical calculation to that quoted above, the following can be demonstrated. At the arterial end of the capillary tree, there is a force of 14.5 mm. Hg. in the direction of filtration. At the venous end there is a force of only 5.5 mm. Hg. in the direction of reabsorption. Under these circumstances, there will, of course, be a tendency to accumulation of fluid in the tissues.

(*C*) *Both physiological disturbances.*—Under these conditions there will be an increase of intracapillary hydrostatic pressure of 5 mm. Hg., and a plasma osmotic pressure of 19.5 mm. Hg. By similar methods of calculation it can be demonstrated that, at the arterial end of the capillary network there is a force of 19.5 mm. Hg. in the direction of filtration, and, at the venous end a force of only 0.5 mm. Hg. in

the direction of reabsorption. The tendency to accumulation of fluid within the tissues is thus overwhelmingly increased.

The objection might well be raised that changes in the osmotic pressure of the tissue fluids have not been taken into consideration in these calculations. However, direct measurements carried out on œdema fluid in congestive heart failure,[7] have shown that there is no increase in the protein content of such fluids. Significant osmotic pressure changes in tissue fluids are thus not to be expected. It is thus quite clear that the addition of a state of hypoproteinæmia to one of increased venous tension, theoretically, at least, adds a very potent factor to the production of œdema in congestive heart failure.

The occurrence of a plasma protein deficit in congestive heart failure is generally conceded, though not strongly emphasized; and it will be further stressed here. The etiology of this deficit, however, is not so generally agreed upon. Several views have been put forward. (1) That it is due to a loss of serum protein into the œdema fluid. In view of the demonstration (*v.s.*) that the œdema fluid in congestive heart failure is of a low protein content, this explanation is unlikely. (2) That it is due to proteinuria. In cases of congestive heart failure which exhibit massive albuminuria, this may well be a factor. However, massive proteinuria is uncommon in congestive heart failure. (3) That it is due to atrophy of liver tissue as a result of chronic venous congestion, resulting in diminished protein synthesis. This is unlikely, except in cases of so-called "cardiac cirrhosis" of the liver, and cardiac cirrhosis is rare. (4) That it is due to chronic under-nutrition. This is by far the most tenable hypothesis, in view of the anorexia and nausea so frequently seen in congestive heart failure, and in consideration of the dietary restrictions still too commonly prescribed in cardiovascular disease. In this connection it is probable that the sequence of events takes place somewhat as follows: (*a*) One of the earliest changes which is known to occur in congestive heart failure is a marked increase in the plasma volume. (*b*) This results in a dilution of the plasma proteins, producing a relative, rather than an absolute hypoproteinæmia. (*c*) If the dietary protein intake is adequate, protein reserves are mobilized from the tissues to make good this deficit. (*d*) If the dietary protein intake is inadequate, such compensation cannot occur, and the hypoproteinæmia persists.

This conception, it is considered, offers a simple explanation of the common observation that some patients with congestive heart failure exhibit plasma protein deficits, while others do not.

During the years 1945 and 1946, in the medical wards of the Montreal General Hospital, a number of patients with congestive heart failure were investigated with regard to their plasma protein levels. Certain facts soon became apparent. (1) A large proportion of the patients admitted to the wards with congestive heart failure and massive œdema exhibited plasma protein levels which, even in the absence of cardiac failure, would have accounted for their œdema. (2) Certain of these patients, when treated by the accepted methods of digitalization, diuretics and sodium restriction, failed to respond with a satisfactory clearing of œdema. (3) When measures were taken to increase the protein intake and raise the plasma protein levels, these patients responded with a rapid diuresis, and an almost dramatic disappearance of the œdema.

CASE 1

N.D., male, aged 53, aortic insufficiency, congestive heart failure. Admitted September 25, 1945, with dyspnœa and massive dependent œdema. Diagnosis: luetic aortitis.

PLASMA PROTEIN LEVELS

	Total	*Albumin*	*Globulin*	*Fibrinogen*
October 9	4.90	2.66	1.54	0.70
October 18	5.53			
November 1	5.25			
November 21 ...	5.60			

From date of admission to October 9, 1945, treatment consisted of digitalis, diuretics and salt restriction. From October 9, a high protein diet was added to this regimen. A significant elevation in the plasma protein levels was noted, and was accompanied by improvement in symptoms and disappearance of œdema.

CASE 2

A.D., male, aged 56. Admitted October 16, 1945, with dyspnœa, massive œdema and ascites. Diagnosis: obesity, hypertensive cardiovascular disease, congestive heart failure.

PLASMA PROTEIN LEVELS

	Total	*Albumin*	*Globulin*	*Fibrinogen*
October 23	4.97	2.10	2.27	0.60
November 5 ...	5.46	3.43	1.61	0.42
November 13 ..	5.95	2.80	2.52	0.63

Treatment on admission consisted of digitalis, diuretics and sodium restriction. Very little improvement was noted. On October 23, 1945, a high protein dietary regimen was added. This was marked by a diuresis of 5 to 7 litres daily, a rapid resolution of the œdema, and a weight loss of 52 lb.

CASE 3

H.W., male, aged 28. Admitted January 2, 1946. He exhibited marked dyspnœa, gross dependent œdema and ascites. Diagnosis: chronic rheumatic heart disease, mitral stenosis, congestive heart failure.

PLASMA PROTEIN LEVELS

	Total	*Albumin*	*Globulin*
January 4	5.52		
January 15	6.17	4.07	2.10

From admission, treatment consisted of digitalis, diuretics, sodium restriction *and* high protein diet. This regimen resulted in rapid improvement with almost complete disappearance of œdema. It will be noted that the plasma protein level rose to "within normal limits".

DISCUSSION

The three cases quoted have illustrated the presence of hypoproteinæmia in congestive heart failure, the failure of such cases to respond completely to the usual therapeutic procedures, and the dramatic resolution of œdema, following the institution of high-protein feedings.

It will be noted that the cases selected for presentation all have plasma protein levels which in themselves would have been sufficient to produce œdema. Other case records are available which show similar beneficial results in patients with less drastic reductions in their serum protein levels. This brings up the point that plasma protein levels which are "within the lower range of normality", should not be too lightly regarded.

Although the so-called "critical level" of plasma protein concentration for the production of œdema is usually quoted at 5.5%, it should be emphasized that hypoproteinæmia of lesser degree may be instrumental in producing and maintaining a state of œdema, when combined with the increased venous pressure which is so often a feature of congestive heart failure.

This is readily realized when one considers that, depending on the relative decreases in albumin and globulin, a fall in plasma protein concentration of as little as 1 gram per 100 c.c. (*e.g.*, from 7 to 6%), may result in a lowering of plasma osmotic pressure of as much as 5.5 mm. of mercury. Such a depression, even in the presence of a plasma protein level "within normal limits", may tip the scale in the delicate balance of fluid interchange between capillaries and tissue spaces.

One would hesitate to suggest that hypoproteinæmia constitutes more than an adjunctive factor in the initiation and maintenance of cardiac œdema. Nevertheless, it is safe to say that, in the past, it has been too lightly dismissed, even as a contributing mechanism; and that, other things being equal, maintenance of the plasma protein level, by a high-protein dietary regimen, should be an effective and valuable aid in the treatment of congestive heart failure.

SUMMARY

1. Plasma protein deficit occurs frequently, though not uniformly in patients with congestive heart failure, especially in those with massive œdema.

2. In conjunction with elevated venous pressure, it may add its weight to the already-present disturbance in the fluid exchange between the capillaries and the tissue spaces.

3. For this reason, it may contribute to the production of œdema, and delay its resolution, even under accepted methods of treatment.

4. This plasma protein deficit is probably the result of an associated chronic undernutrition, although other factors may be of subsidiary importance.

5. Unless other features contraindicate, high protein diets should be prescribed as an adjunct to the accepted methods of treatment in congestive heart failure.

6. Illustrative cases are submitted.

REFERENCES

1. STEVENSON, J. A. F., SCHENKER, V. AND BROWNE, J. S. L.: *J. Canad. Med. Serv.*, 2: 345, 1945.
2. GOLD, H.: *J. Am. M. Ass.*, 133: 16, 1947.
3. SCHEMM, F. R.: *Ann. Int. Med.*, 17: 952, 1942; *Ibid.*, 21: 937, 1944.
4. WHEELER, E. O., BRIDGES, W. C. AND WHITE, P. D.: *J. Am. M. Ass.*, 133: 16, 1947.
5. KARRELL, P.: *Arch. Gen. de Med.*, 2: 513, 1866.
6. WARREN, J. V. AND STEAD, E. A., JR.: *Arch. Int. Med.*, 73: 138, 1944.
7. STEAD, E. A., JR., AND WARREN, J. V.: *J. Clin. Invest.*, 23: 283, 1944.

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Nearly 500 years ago, Leonardo da Vinci gave this prescription for healthy living: "Do not eat when you are not hungry; feed lightly at night; masticate your food well; let it be simple and well done; drink no wine between meals, nor on an empty stomach; have no sleep in daytime, and cover yourself well at night; take no medicine, and never fly into a rage; avoid luxury and keep to a regular diet."

CASE REPORTS

PULMONARY TUBERCULOSIS WITH PREGNANCY AND TOXIC GOITRE

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This case is of interest for three reasons. It illustrates (1) the successful application of modern therapy to advanced pulmonary tuberculosis, no sanatorium bed being available; (2) the course of a pregnancy in the presence of pulmonary tuberculosis; and (3) the development of a toxic goitre and its cure, in a patient under treatment for pulmonary tuberculosis. While co-existence of the latter two conditions may not be rare in some localities, it is at least unusual in this district. I have seen these two conditions combined in only one other patient.

This patient, a white female, single, aged 18 years, stenographer, consulted me on August 30, 1939, concerning an upper respiratory tract infection. A complete examination was not made but the temperature, pulse, weight and blood pressure were recorded. She was apparently a normal healthy girl. She was next seen on January 21, 1942. She had married in the interval and her husband was in the army and the patient still working. A diagnosis of right dry pleurisy was made. Physical examination of the lungs was normal. No friction rub was heard. The patient recovered in a few days. An x-ray was advised but the patient neglected to have it made and returned to work.

The next visit was April 16, 1942. She was referred this time by Dr. Oscar Nutik, who had diagnosed pulmonary tuberculosis. Complaints were cough (2 months) and expectoration for one day of 8.0 c.c. The family history revealed no exposure to tuberculosis. Past history revealed no pulmonary disease. Systemic enquiry revealed loss of weight 8 lb. in 6 months, fatigue, (1 week). No other symptoms. Menses had been regular.

Physical examination was normal except for the lungs. The right lung showed dullness over the lower lobe. Large rales over the lower lobe. Transitory rhonchi over the mid lobe. Left lung, clear. Sputum contained many acid-fast bacilli typical of *M. tuberculosis*, on several direct smears. X-ray revealed a cavity 4.0 c.m., in diameter in the posterior inferior part of the right upper lobe (Fig. 1).

No bed was available for her treatment in a sanatorium, and it became necessary to treat the patient at home. On May 4, 1942, a right-sided pneumothorax was instituted. The patient's condition improved rapidly. On May 20, the sputum was still positive. On June 9, expectoration ceased and has not recurred. On September 17, a single string-like adhesion was cut (Figs. 2 and 3). On November 27, patient was in bed 16.5 hours out of every 24, and walking outside 15 minutes daily. On March 5, 1943, she was advised to spend 21 hours in bed because fluid had developed in the right pleural cavity. By July, 1943, she was well and leading a fairly active life.

This terminates the first phase of this patient's case, illustrating the successful use of modern treatment at home.

On July 17, 1944, she was confined and delivered of a normal child. She remained well and was gaining weight until November 14. This terminates the second phase of this case report, illustrating the usual course of a pregnancy in a tuberculous woman. The pregnancy did not disturb the trend of the tuberculous disease.

On November 28, the patient had lost three pounds. She continued to lose weight; the losses recorded as she came fortnightly for the pneumothorax refills were 3 lb., 2 lb., 1 lb., 3 lb., 6 lb., 5 lb. During this period the pulse rate rose and so did the systolic blood pressure. During this period thorough search was made for evidence of reactivation of the pulmonary disease and for evidence of tuberculous disease elsewhere. None was found. As a precaution, however, bed rest was prescribed. The loss of weight persisted. Towards the end of this period, on February 20, 1945, the patient's facies as she entered the office for her refill, made the diagnosis obvious. She complained of weakness and palpitation. The thyroid gland was enlarged. The eyes were prominent, lid lag was present and the forehead did not wrinkle with upward gaze. There was a slight fine tremor of the hands. No cardiac murmur. Diagnosis: toxic goitre. The basal metabolic rate on March 9 and 12, was +53. On March 15, Tr. Iodi Co. gtt. v, t.i.d., was prescribed which was increased to gtt. vii next day. The basal metabolic rate on this date was +39, and on March 21, +25.

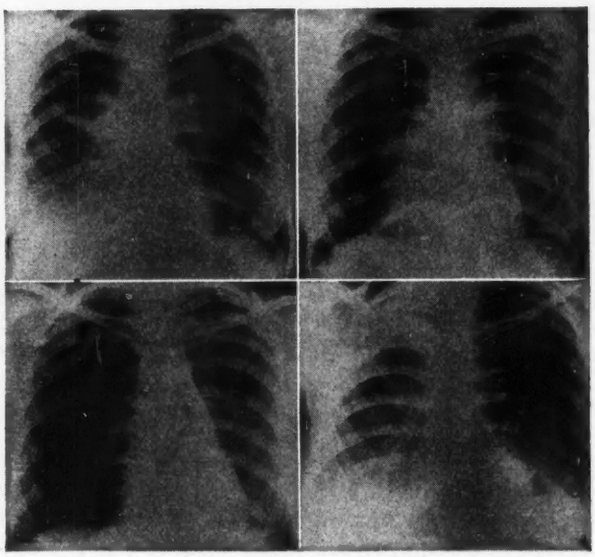

Fig. 1. (April 14, 1942).—Cavity 4.0 cm. right upper lobe. Disease right lower lobe. **Fig. 2.** (May 27, 1942).—Right pneumothorax with adhesion. Small amount of fluid. **Fig. 3.** (November 11, 1942).—Right pneumothorax. Adhesion cut. Good collapse. Some fluid. **Fig. 4.** (September 17, 1947).—Thickened pleura and pulmonary fibrosis right. Eight months' pregnant.

On March 23, a right hemi-thyroidectomy was done. The pathological diagnosis was: heterotrophic adenoid goitre. On March 26, Tr. Iodi Co. gtt. x, q.d., was prescribed. A disturbing factor was a report received on April 5, that fluid aspirated from the right pleural cavity on March 23, was positive for *M. tuberculosis* on culture. On May 11, the basal metabolic rate was +3 and on May 12, the thyroidectomy was completed. Convalescence was uneventful.

On August 10, 1945, the pneumothorax was discontinued. The reasons for stopping it were that it had been kept up for almost the customary period of three years of complete collapse; and, because the presence of fluid and the positive culture from it made its continuation a dangerous procedure. On August 24, the patient was doing light housework. On October 10, 200 c.c., of clear liquid was removed from the right pleural cavity. *M. tuberculosis* could not be demonstrated in this liquid either by smear or by culture.

The patient has remained well. She has had a second healthy child in October, 1947, and at date of this report (December) weighs 144 lb. and is in good general condition. X-ray on November 26 showed no change from previous films (Fig. 4). She has no sputum. Stomach lavage could not be done as she could not swallow the tube. The baby has been given B.C.G. vaccine.

The family history subsequent to April, 1942, is of interest. All were eventually examined as contacts and were found to be well, except one sister. The latter who had slept with the patient until April 14, 1942, showed on April 28, 1942, when she was first examined, a slight enlargement of the left hilar shadows. On August 16, 1942, she complained of pain at the right base. This recurred on August 25, and was accompanied by fever of 101.4°, pulse 116, and a friction rub. Pleural effusion developed, and the presence of liquid confirmed by aspiration. She was given the usual treatment, returned to part time work after nine months, and to full time work after twelve months. She has remained well. No parenchymal lesion has developed to date. The patient's first child was given oral B.C.G. vaccine at birth. At age 2½ years he weighed 32 lb., and has never been ill. The patch test was faintly positive. B.C.G. vaccine was repeated.

No attempt is made to draw any conclusion from this single case. It does illustrate the relationship between pleurisy and pulmonary tuberculosis, the lack of any effect of pregnancy on the pulmonary tuberculosis, and the course of a toxic goitre in a tuberculous patient. It also shows that, while a sanatorium is the ideal place in which to treat pulmonary tuberculosis, nevertheless, when a sanatorium bed is not immediately available, one is not justified in waiting until one becomes available if there are curative measures that can be safely applied in the patient's home during the waiting period.

I wish to thank Dr. Samuel Reich, Dr. Leila Goulden and Dr. J. C. Lanthier, radiologists, for use of the radiographs. Intrapleural pneumonolysis and thyroidectomy by Dr. J. C. Wickham. Obstetrical care by Dr. H. R. D. Gray.

There is still more productive crop land in the United States per capita than the average of the world as a whole, although much has been lost by erosion and poor farming practices.

HEREDITARY HÆMORRHAGIC TELANGIECTASIA

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Hereditary hæmorrhagic telangiectasia is not an uncommon disease and since Osler's paper[1] in 1901 many cases have been reported. Goldstein[2] estimated that up to 1931 about 500 to 550 cases of telangiectasia have been recorded in some 90 to 95 families. Figures from the Mayo Clinic record 31 cases from 1920 to 1944 inclusive, but none gave a history of recurring gastro-intestinal hæmorrhage until Gambill[3] reported a case in 1946. Review of the general literature shows reports of hæmorrhage from many different sites but the incidence of gastro-intestinal bleeding is very low.

The main criteria for diagnosis are: (1) A familial or hereditary incidence. Both males and females may be affected and apparently the disease may be transmitted by either. (2) Telangiectatic lesions in areas throughout the body and frequently in the nasal mucosa which give rise to recurrent epistaxis. The lesions are often also noted in the skin of the face, neck, lips, tongue, mouth and throat. Pierose[4] reported a case of hæmangioma of the gastro-intestinal tract, which is most interesting in the light of the report that follows.

The case reported by Pierose was in brief: a 29 year old woman who had severe recurrent gastro-intestinal hæmorrhages for the previous 13 years and who had been operated on previously on two occasions with essentially negative findings. In March, 1939, she was again operated on and a resection of 3 feet of the jejunum and proximal ileum was done with the following findings:

Pathological report: Diffuse telangiectatic cavernous hæmangioma of jejunum. Microscopic examination of numerous sections showed increased vascularity in all layers. Large spaces lined with endothelial cells and containing blood was found in serosa and muscularis. Occasional plexiform groups of small thin-walled vessels were also present. Patient was well 9 months after.

The present report is that of a nephew of the above, a young man of 21 years with a history of repeated severe gastro-intestinal hæmorrhages since the age of 10. On two occasions these were very severe, prostrating and productive of a severe but temporary anæmia. On

his first admission to the University Hospital in November, 1946, he had been bleeding for about 24 hours and stools contained both bright red blood and tarry material. He had about 12 bowel movements in the previous 25 hours.

Past illnesses.—None serious.

Personal history.—Good habits, a discharged navy veteran.

Family history.—His father, aged 52, had similar gastro-intestinal hæmorrhages and was told that as a youth he passed blood per rectum on occasions but had no severe hæmorrhage until the age of 27. These recurred at intervals but without any history of dyspepsia or abdominal pain. In 1929 because of a barium series suggesting a possible duodenal ulcer, a gastro-enterostomy was done. The operative findings unfortunately could not be located and the hæmorrhages have recurred at intervals since. His father's sister was the case reported by Pierose and briefly summarized above.

Functional inquiry was essentially negative except as above—no history of nosebleeds or bleeding elsewhere —no tendency to excessive bruising.

Physical examination was essentially negative. No telangiectatic areas were noted on the skin, nasal mucosa, mouth, tongue, or pharynx. Abdominal examination was entirely negative.

Laboratory findings.—Hb. 66%, 9.7 gm.; red blood cells 3,240,000; white blood cells 5,800; polymorphonuclears 67%, lymphocytes 33%; bleeding time 2 min. (Duke method), clotting time 4 min. (capillary tube method; platelet count 162,000 per c.mm.; clot retraction normal; Hess capillary test normal; urine negative; stools positive for occult blood. Gastric analysis following alcohol test meal: free HCl. 63, 35, 38, 44, 44— fasting specimen 75 c.c. Stool culture, no pathogenic organism isolated, stools negative for cyst and ova. Sigmoidoscopic examination negative; barium examination of stomach and duodenal normal, barium enema normal.

Patient was discharged on a smooth diet, to return if his hæmorrhages recurred. He reported again 4 months later with a moderately severe hæmorrhage. Findings were unchanged. Platelet count was 259,000 per c.mm.

Because of the severity of the hæmorrhages and with the history of the aunt who apparently had considerable improvement following resection, an exploratory laparotomy was done by Dr. W. McKenzie who reported as follows:

"A right rectus incision was made and on opening the peritoneum the stomach and duodenum were first palpated and examined. They were within normal limits. Gall bladder and liver appeared normal, small bowel was examined minutely from the ligament of Treitz to the ileo-cæcal valve. It exhibited throughout its whole length dilated varicose veins or telangiectasis over the serosal surface of the bowel. In some segments the varicose veins were much larger than others and a little more numerous and prominent but there was no area of the bowel completely free from some vascular abnormality. At the ileo-cæcal valve this process seemed to terminate and the cæcum, ascending colon, transverse colon, and remaining large bowel appeared to be normal. No evidence of splenomegaly. Abdomen closed in the usual manner. Because of the extent of the lesion no operative procedure was thought feasible. Postoperative diagnosis: multiple varices and telangiectasis of the entire small bowel, serosal surface."

When last seen 3 months postoperatively patient was well with no further bleeding.

SUMMARY

A case of hereditary telangiectasis is reported in which the involvement was apparently localized only to the small bowel. The aunt had a similar condition proved at operation and the father in all probability has the same condition, although the latter is based on history alone.

REFERENCES

1. OSLER, W.: *Bull. Johns Hopkins Hosp.*, 12: 333, 1901.
2. GOLDSTEIN, H. I.: *Arch. Int. Med.*, 48: 836, 1931.
3. GAMBILL, E. E.: *Proc. Staff Meet. Mayo Clin.*, 21: 157, 1946.
4. PIEROSE, P. N.: *J. Am. M. Ass.*, 115: 209, 1940.

INTRA-ABDOMINAL, EXTRA-UTERINE PREGNANCY*

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A full term intra-abdominal, extra-uterine pregnancy is sufficiently rare to be presented, especially when both mother and child are alive and well. Hellman and Simon[1] made a comprehensive review of full term intra-abdominal pregnancies. From 1809 to 1933 they collected 316 cases reported in all medical literature. About one-third of the mothers died. There were only 80 babies that actually lived and of these there were 50 cases that both mother and baby were well.

A primipara, 29 years old, was first seen October 3, 1946. Her last menstrual period began August 7, 1946. She complained of nausea and vomiting. Her pelvic measurements revealed a small pelvis. Her blood pressure was 120/75; urinalysis, negative; Kahn, negative.

On February 21, 1947 she had a rise in blood pressure, 160/80; albumen, one plus. She complained of abdominal pain which was severe at times. The patient also had a small amount of intermittent bleeding. During the following month she complained of frontal headache, visual disturbances (spots before her eyes) and some swelling of the ankles. These toxic symptoms were treated by rest, diet and sedation with no improvement. On March 21 her blood pressure was 185/120 and she appeared to be quite ill, complaining of a severe frontal headache.

Laparotomy was done March 29 at about 7½ months' pregnancy. On opening the abdomen a large bulge appeared at the level of the umbilicus. On inspection it had the appearance not unlike a fetal sac and on palpation fluid was felt. This was incised and on examination the inner wall of the sac was smooth and white. This was identified as a congenital distended urachus. After some of the urine had escaped it was then possible to determine that the urachus was adherent to the fetal sac lying beneath.

The sac was opened and the fetus was found lying in a transverse position with the head to the right. It was removed. The placenta was deep and appeared to be attached to the left ovary and tube. It was about one-fourth of the average size and was removed with comparative ease. A small piece of ovarian tissue alongside of the placenta was also removed. The bleeding was not very extensive and was soon controlled. The fetal sac was adherent to the small intestine and the upper border was attached to the transverse colon. It was not possible to identify the uterus due to the urachus and the mass of adhesions formed by the fetal sac and the intestine. A penrose drain was inserted and the ab-

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*Read before the Medical Staff of the Royal Columbian Hospital, New Westminster, B.C., on May 26, 1947.

domen closed. A considerable amount of bloody discharge drained for several days and the penrose drain was removed on the 5th postoperative day. The patient made an uneventful recovery.

The baby at birth weighed 3 lb. 5 oz. It had a peculiar dome-shaped head. Within a few weeks the shape of the head improved and it gained weight rapidly. At 6 weeks it weighed 5 lb. 2 oz.

Pathological report (Dr. H. H. Pitts).—Piece from fetal sac 3 x 2 x 0.5 cm. Ovarian tissue 6 cm. in diameter. Placenta, one side of placental sac 2 cm. in diameter.

Microscopic.—Sections were taken through a large plaque-like thick greyish yellow area on the fetal aspect of the placenta and these show a marked degenerated almost amorphous infarcted structure in which occasional very degenerated but still recognizable chorionic villi are seen. Sections through a number of other areas and the sac-like structure all show relatively normal placental tissue except from small areas of infarction. There is no evidence of any other tissue structure noted, that is to say, ovary, tube, etc., and I believe this is a definite intra-abdominal extra-uterine pregnancy.

COMMENT

According to Mason[2] (1940) the placenta should be removed only if it is easily done, otherwise it is better to be left alone as the peritoneum will absorb both the placenta and the fetal sac. He also states that if the placenta is left no drain should be inserted as this will cause an increased danger of infection and higher mortality. With sulfa drugs and penicillin at our disposal the danger of infection has no doubt diminished. The diagnosis of intra-abdominal, extra-uterine pregnancy is somewhat difficult. The following are some of the important points: (1) A careful history should be taken; it may reveal symptoms of an early ectopic pregnancy. (2) On palpation the fetus seems directly under the abdominal wall. (3) The fetal heart beat is louder than usual. (4) There is often found a small amount of vaginal bleeding. (5) By doing a bi-manual examination an enlarged uterus may be felt alongside of the fetus.

SUMMARY

1. A case of intra-abdominal, extra-uterine pregnency has been reported.

2. Toxic symptoms which appeared in this case are unusual in such pregnancies.

3. We found in this case a distended congenital urachus which is also rare.

4. The placenta was removed quite easily and comments were made on the advisability of removal of placenta.

5. A review of some of the important points in the diagnosis of intra-abdominal, extra-uterine pregnancy is made.

For valuable advice in this case I wish to thank Dr. George Wilson, Chief of Surgery, Royal Columbian Hospital, New Westminster, B.C.

REFERENCES

1. HELLMAN, A. M. AND SIMON, H. J.: *Am. J. Surg.*, 29: 403, 1935.
2. MASON, L. W.: *Am. J. Obst. & Gyn.*, 39: 756, 1940.

SUCCESSFUL CLOSURE OF A PERFORATED PEPTIC ULCER IN A MAN 84 YEARS OF AGE

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Perforation of a simple peptic ulcer is a relatively rare event in older people. Sandell[1] in 1936 collected the records of 5,740 gastro-duodenal perforations from the literature, and of these only 57 were over the age of 60. He reported the successful suture of a juxta-pyloric perforation in a man of 82 which was the oldest case recorded up to that date. Graham,[2] in 1937, also performed a successful operation for perforation in a man of 82. In 1943, Tanner[3] reported 16 cases of perforated ulcer in patients over 60 with 10 deaths. His oldest recovery was a patient of 79. Ashton[4] in 1944 reported a case of perforated ulcer in a man of 80 with recovery following simple suture.

The mortality of operation for perforated ulcer in people over 60 is 50 to 60%. The chief causes of death in these patients are bronchopneumonia and cerebral thrombosis.

The following case is reported to record the successful closure of a perforated ulcer in a man of 84, and to outline a method of management which minimizes the possibility of postoperative complications.

The patient, a male aged 84, was admitted to the Montreal General Hospital, February 13, 1946. He gave a history of 8 hours of steady agonizing epigastric pain. He had previously been attending the outdoor clinic complaining of vague dyspepsia of one year's duration, and barium series had shown an irritable spastic duodenal cap but no definite ulcer crater. He was put on a Sippy diet which gave partial relief until the onset of his present complaint.

On examination the positive findings were limited to the abdomen. This was slightly distended and did not move on respiration. There was board-like muscular rigidity in the epigastrium and tenderness above the umbilicus. The liver dullness was obliterated and rebound pain was present. A flat plate of the abdomen showed free gas below the right diaphragm.

A diagnosis of perforated peptic ulcer was made and laparotomy was performed 10 hours after the onset of symptoms. Under cyclopropane anæsthesia a transverse incision was made above the umbilicus and the right rectus was divided. On opening the peritoneum a large amount of turbid fluid was found and after this had been aspirated the stomach and

duodenum were visualized. A perforation 5 mm. in diameter was seen in the anterior wall of the first part of the duodenum. This was closed by placing three Lembert type sutures of chromic catgut through healthy tissue wide of the ulcer and tying them over a piece of omentum which was drawn over the defect. A Penrose drain was placed at the site of the perforation and brought out through the lateral end of the wound. The abdomen was closed in layers with interrupted chromic catgut. Postoperatively the patient was given penicillin for 4 days and continuous gastric suction was maintained for 24 hours with intravenous amigen and glucose as parenteral feedings. The patient was allowed up in 24 hours and started on a Sippy diet which was quickly increased to a convalescent ulcer regimen. He was discharged from hospital on the tenth postoperative day with the wound soundly healed and free from complaints. He has since been followed in the outpatient clinic and has remained well.

COMMENT

1. This case is believed to be the oldest on record of successful closure of a perforated peptic ulcer.

2. Early ambulation is important in preventing the pulmonary and cerebral complications so frequent in the aged.

REFERENCES

1. SANDELL, D. H.: *Brit. M. J.*, 1: 210, 1936.
2. GRAHAM, R.: *Surg., Gyn. & Obst.*, 62: 235, 1937.
3. TANNER, N. C.: *Brit. M. J.*, p. 563, May 8, 1943.
4. ASHTON, G. W.: *Med. J. Australia*, 1: 130, 1944.

TUBERCULOUS MENINGITIS TREATED WITH STREPTOMYCIN

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The literature contains references to 13 cases of tuberculous meningitis which have been favourably affected by streptomycin, of which two are symptom free.[1 to 5] These and others perhaps as yet unreported indicate that means of combating this heretofore fatal disease is now at hand. The fact that residual brain damage is simultaneously reported cannot be held an argument for withholding this drug. As Hinshaw *et al.* conclude, the overall accomplishment is the prolonging of life and the alteration of the usual course of tuberculous meningitis, and the fact that 2 infants are symptom-free is the goal at which to aim.

Hinshaw, Pyle and Feldman[6] assess streptomycin as of greatest value in those conditions where a temporary suppression of the infection may enable the patient to gain ascendency over his disease. In support of this claim is the report of Baggenstoss, Feldman and Hinshaw[7] who studied the post mortem specimens of four fatal cases of miliary tuberculosis. They claim that in one case meningitis was apparently inhibited, and was prevented or cured in two other cases. In this particular series, the dosage of streptomycin had varied between 56 to 60 gm. over a period of 2 months, 248 gm. over 3½ months, and 242 gm. over 6 weeks, given both intrathecally and intramuscularly.

They further report that they could find no histological evidence of any effect of streptomycin, other than a possible renal tubule damage in one case. It is therefore held that the more significant residual neurological disturbances are the product of tuberculous meningitis inadequately controlled and not the toxic effect of streptomycin. Until a better agent is made available the one presently at hand must be energetically used.

CASE HISTORY

The following case is reported as an example of the problems in the management of tuberculous meningitis.

K.G., aged 2½ years, had been ill for 10 days prior to admission to hospital on April 2, 1947. He had become ill-tempered, easily irritated, and refused his food. Pain in the chest, moderate fever and constipation progressively developed. On the day of admission neck rigidity and vomiting began, and the patient was admitted for observation.

The past history and family history were not contributory. Tuberculous contacts were sought for and not found. Physical examination revealed an irritable, whimpering child demonstrating photophobia, and vomiting his food two or three times during the day. There was neck rigidity and a positive Kernig's sign. The pupils were moderately dilated but reacted sluggishly to light. No gross lesions were found in the chest.

The deep reflexes were hyperactive throughout, with ankle clonus, spastic paralysis, and extensor plantar Babinski response on the left side. Examination of the cerebrospinal fluid revealed an initial pressure of 530 mm. c.s.f. The fluid had a ground-glass appearance and developed a coagulum on standing. No acid-fast organisms were found in the Ziehl-Neelsen stain of the coagulum smear. The cell count on the sample of spinal fluid was 245 cells, mostly lymphocytes. Subsequent biochemical examination reported glucose 15 mgm. %; chlorides 685 mgm. % which eventually dropped as low as 596 mgm. %; protein 112 mgm. % (see Table I).

An x-ray of the chest revealed a primary bronchopneumonic process in the right upper lobe. A Mantoux test was strongly positive, and a guinea pig inoculation of an early specimen of cerebro-spinal fluid was subsequently as positive for tuberculosis.

Streptomycin was given, in a dosage of 25 mgm. intrathecally daily for the first two days, and increased to 50 mgm. for the next 10 days before rising to 100 mgm. daily. At one time, however, as much as 300 and 500 mgm. were being given alternate days intrathecally. At the same time 50 to 150 mgm. were given intramuscularly every three hours. From this experience, as well as the literature, it would appear that 300 mgm. intrathecally should be given daily, until the fall in the initial spinal fluid pressure, the drop in the temperature, the return of the spinal fluid cell count

* Referred from the Surgical Service of Dr. M. Weinlos, F.R.C.S.[C.]. Misericordia Hospital, Edmonton, Alberta.

and differential to normal limits indicate that a balance must now be struck between continued suppression of the tuberculous process and the avoidance of a possible chemical meningitis. In this case, towards the end, it was felt that the continued high dosage of streptomycin might be contributing to a persistence of spinal fluid cell count of the magnitude of 40 to 50 cells.

The total dosage of streptomycin amounted to 7.0 gm. intrathecally, and 70.0 gm. intramuscularly over a period of 4 months, necessitating 41 lumbar spinal taps. A dosage of 15 gm. was continued, q. 6 h. intramuscularly till December 16.

resolved the spinal block, and minimized the resultant hydrocephalus.

In this case, the temperature returned to normal within 30 days, and remained within normal limits but for occasional elevations to 100 degrees for one day.

Nursing care was that of a totally incapacitated infant, with the problem of maintaining adequate fluid intake as well as daily bowel evacuation. During the course of active treatment the patient contracted chicken pox which was prevalent among the nursing staff, but apparently this had no significant effect on the course of the disease.

TABLE 1.

LABORATORY FINDINGS IN SPINAL FLUID WITH OBSERVATIONS ON CLINICAL PROGRESS.

Date		*Init. c.s.f. pressure in mm. c.s.f.*	*Cell total* %	*Count lymphs.* %	*Prot. mgm.* %	*Gluc. mgm.* %	*Chlor. mgm.* %	*Streptomycin intrathecal*	*Remarks*
April	4	530	245	most	112	15	685	...	
	5	300	177	93	...	..	...	...	
	6	...	200	79	...	..	...	25 mgm.	
	7	430	232	81	...	..	...	25	
	8	490	...	..	...	15	596	50	
	9	470	...	..	...	..	...	50	
	10	370	105	66	...	..	775	50	Rt div. strab.
	11	320	132	69	...	34	694	50	Papilloedema
	12	...	...	..	...	..	...	50	
	13	370	...	..	...	..	...	50	Blind?
	14	135	...	..	...	..	...	50	
	16	240	...	..	...	..	...	50	
	18	235	82	40	...	..	...	50	
	19	140	48	70	...	..	...	100	Cephalic scream.
	21	175	240	15	65	35	700	100	Blind! Deaf?
	23	295	215	11	...	..	...	...	
	25	220	190	12	...	..	...	300	Chicken pox
	27	240	...	..	...	..	...	200	
	29	240	...	..	...	..	...	300	Difficulty swallowing
May	1	165	107	65	...	..	...	300	Hearing?
	3	125	380	27	...	..	...	300	
	5	215	...	..	...	..	...	300	Spinal block
	6	185	...	..	93	..	..	500	Hears well!
	8	215	...	..	...	..	...	500	
	10	135	...	..	...	..	...	500	Conus coma?
	12	160	...	..	106	34	760	500	for 24 hr.
	14	120	...	..	...	..	...	500	
	17	...	...	..	...	..	...	500	
	19	90	50	75	...	..	...	500	
	22	90	125	40	...	..	...	300	Dynamics normal
	26	170	88	43	...	..	...	300	Muttering!
	30	140	77	28	...	..	...	300	
June	2	130	30	34	...	..	...	300	Pupils contract
	11	110	77	86	...	..	...	500	
	19	160	49	80	...	..	...	Discontinued	
	25	130	35	35	...	..	...		
July	23	130	2	..	68	50	775		
August	12	175	10	..	...	..	...		

It is highly probable that the early dosage of streptomycin was inadequate, and it may be that less residual neurological damage would have resulted if the early dosage had been higher. Hinshaw, *et al.*[1] recommend that 100 to 200 mgm. streptomycin in 1 to 5 c.c. c.s.f. or normal saline be administered intrathecally or cisternally daily.

At each intrathecal injection, the spinal fluid pressure was cautiously reduced to within normal limits, and the streptomycin then introduced. In spite of this a certain degree of hydrocephalus resulted from the increased intracranial pressure, as seen by repeated x-rays of the skull. Partial and, over a period of 10 days, probably complete spinal block was a problem, but it was felt that the block was relieved by daily injection of streptomycin after cautious manipulation of the spinal fluid even against some degree of resistance. The daily effort to maintain a near-normal intracranial pressure perhaps

It should be emphasized that at the height of the disease and for some weeks, this patient was in a completely vegetative state. He was apparently blind and deaf, able only to swallow food put in his mouth. At the present time (January 5, 1948) he can both see and hear. He plays at about the same level as an eighteen months' child. (He is now 3 years). He seems happy and contented, and is of normal weight and height. However, residual weakness of the left arm remains and he is unable to sit up. No attempt is made to speak, and the child's eyes

lack the glint of awareness and intelligence.

An x-ray dated December 16, shows resolution and some degree of calcification of the tuberculosis lesion in the right upper lobe.

SUMMARY

Fourteen cases of suppressed tuberculous meningitis are now reported in the literature. Of these, two are considered by their authors to be entirely symptom-free, while the others admittedly have residual neurological signs and symptoms which include mental deterioration, blindness, deafness, cerebellar disturbances and various paralyses.

Herein is presented the case of a 2½ year old infant with conclusively proved tuberculous meningitis treated with streptomycin. Nine months after initiation of therapy, the intracranial inflammatory process appears to have been suppressed, and the child continues to progress.

The problems of management of the acute stage as well as the post-inflammatory stage which, prior to the advent of streptomycin, did not present themselves, are described. Tuberculous meningitis, if the patients are not open sources of infection may well be handled in general hospitals if other facilities are not available. It requires early diagnosis and immediate institution of adequate therapy.

It is suggested that an initial dosage of 300 mgm. streptomycin intrathecally be given daily, concomitantly with 2 to 4 grams intramuscularly. Changes in dosage should be made on a basis of: (*a*) Initial spinal pressure on the day of therapy; (*b*) daily temperature; (*c*) cerebrospinal fluid cell count and differential.

Increased intracranial pressure maintained over long periods of time appears to be of great significance in the prognosis of those cases successfully suppressed.

We desire to express our appreciation for the devoted care and attention given unstintingly by the Nursing Staff of the Pædiatric Service of the Misericordia Hospital. We wish further to thank the City Relief Department and the Edmonton Chapter of the Canadian Red Cross Society for their contribution of funds adequate to supply the necessary amount of streptomycin.

REFERENCES

1. HINSHAW, H. C., FELDMAN, W. H. AND PFEUTZE, K. H.: *J. Am. M. Ass.*, 132: 778, 1946.
2. KRAFCHIK, L. L.: *J. Am. M. Ass.*, 132: 375, 1946.
3. COOKE, R. E., DUNPHY, D. L. AND BLAKE, F. G.: *Yale J. Biol. & Med.*, 18: 221, 1946.
4. Clin. Path. Conf., Willard Park Hospital, N.Y., *Arch. Pædiat.*, 64: 210, 1947.
5. Clin. Path. Conf., Willard Park Hospital, N.Y., *Arch. Pædiat.*, 64: 42, 1947.
6. HINSHAW, H. C., PYLE, M. M. AND FELDMAN, W. H.: *Am. J. Med.*, 2: 429, 1947; abst. *J. Am. M. Ass.*, 134: 1122, 1947.
7. BAGGENSTOSS, A. H., FELDMAN, W. H. AND HINSHAW, H. C.: *Proc. Staff Meet. Mayo Clin.*, 22: 265, 1947.

THE USE OF BAL (2, 3 DIMERCAPTOPROPANOL) IN ARSENICAL ENCEPHALOPATHY*

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The use of BAL (2, 3 dimercaptopropanol) in the treatment of certain toxic manifestations seen in arsenotherapy appears to be of significant value. A short and comprehensive review of the compound and its clinical applications has been written by Eagle[1] who reported a 20% mortality rate in cases of toxic encephalopathy treated by BAL. In 8% of these patients treatment had been delayed from 9 to 72 hours. Cohen *et al.*[2] report one case of encephalopathy due to arsenotherapy which was treated successfully by BAL. In view of Tzanck's[3] report that 75% of patients with severe encephalopathy have a fatal outcome, it may be reasoned that BAL does have a real curative effect if given early and in adequate amounts.

The following cases are reported as examples of arsenical encephalopathy which were treated by BAL. The product used was 10% solution of BAL in peanut oil containing 20% benzyl benzoate.

CASE 1

L.T., a coloured male, aged 24, was admitted July 16, 1945, with a primary sore and an early secondary syphilide. Examination showed a small adult negro 5′ 7″ tall, weighing 120 pounds. The only abnormalities were an indurated ulcer on the glans penis near the meatus with right inguinal lymphadenopathy and an erythemato-papular eruption on the arms, legs and chest. Blood pressure was 110/74. Laboratory investigation showed urinalysis negative, blood urea nitrogen 13 mgm. %, van den Bergh 0.1 mgm. fasting blood sugar 0.100 gm., urobilinogen present in 1:200 dilution of urine, prothrombin time 17 seconds, a normal electrocardiogram and a normal x-ray of the chest. Treatment was begun on July 18 with mapharsen 240 mgm. daily in 2,400 c.c. of 5% dextrose solution intravenously for 8 hours. This was continued for a total of 1,200 mgm. of mapharsen during 5 days. In addition he was given ascorbic acid 300 mgm. daily, crude liver extract 1 c.c. daily and bismuth subsalicylate 2 c.c. on the first, third and fifth days. Apart from some nausea on the first day there was no sign of reaction until the fifth day when the temperature rose to 100°. On the sixth day routine lumbar puncture was performed and the spinal fluid showed no abnormality. Fever continued at 100 to 102° with no complaint from the patient until the ninth day when he suffered a convulsive clonic seizure at 10.00 p.m. Lumbar puncture was repeated and the spinal fluid showed Pandy positive and 16 lymphocytes. Sodium amytal 3¾ grains and 60 c.c. of 50% dextrose intravenously was administered. Another convulsion occurred at 2.45 p.m. and the intravenous dextrose was repeated. Beginning at 3.45 p.m. BAL was administered in a dosage of 3 mgm./kg. body weight every four hours for five doses during the first 24 hours, then once daily

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for two days. Thirty hours after the first convulsion the patient regained consciousness. During the coma he was fed orange juice and eggnogs through a stomach tube.

CASE 2

K.M., a white male, aged 17, was admitted January 2, 1947 with primary sero-positive syphilis. Examination showed a young adult 5′ 11″ tall weighing 130 lb. He appeared older than his stated age and looked fatigued and was recovering from a recent alcoholic bout. Other findings included a superficial ulceration of the frenum of the penis and bilateral enlarged non-tender inguinal lymph nodes. Laboratory investigation showed urinalysis negative, hæmogram within normal limits, blood urea nitrogen 15 mgm. %, fasting blood sugar 0.100 gm. bilirubin 0.1 mgm. urobilinogen present in 1:200 dilution of urine, prothrombin time 15 seconds. Electrocardiogram and chest x-ray were both normal. In view of the patient's weight he was given 200 mgm. mapharsen daily in 2,400 c.c. of 5% dextrose by intravenous 8 hour drip, or a total of 1,000 mgm. mapharsen during five days. Bismuth 2 c.c. was given on the first, third and fifth days and also crude liver extract 1 c.c. daily. On the first day he had a mild febrile Herxheimer reaction but nothing further except some moderate nausea and vomiting on the last four days. On the sixth day, following routine lumbar puncture he had a mild headache and that evening was slightly confused. At 5 a.m. on the seventh day he became irrational with purposeless movements of head and limbs, pupils dilated, fixed, corneal reflex present and incontinence of urine. There was no neck stiffness and plantar response was doubtful. At 11.35 a.m. patient suffered an epileptiform seizure, following which pupils reacted slowly to light, sensation to pain was diminished and there was bilateral extensor plantar response. Injections of BAL were begun at once in dosage of 3.5 mgm./kg. body weight every four hours. A second convulsion occurred on the eighth day which was less severe. On the ninth day at 12.00 a.m. he first responded to spoken word and BAL was discontinued on the tenth day after twelve injections, when he was fully recovered. In addition to BAL, patient received gardenal 3 grains after his second fit and was sustained by tube feedings of 1,500 c.c. eggnog daily while comatose.

CASE 3

W.McC., a coloured male, aged 29, was admitted February 24, 1947, with a diagnosis of primary seropositive syphilis, complicated by a severe balanitis and phimosis. Examination revealed a healthy-looking, well developed negro, 5′ 7″ tall and weighing 145 lb. with a marked balanitis with phimosis and profuse purulent discharge. The inguinal lymph nodes were tender and enlarged on both sides. Laboratory findings included urinalysis negative, blood urea nitrogen 11 mgm. %, fasting blood sugar 0.125 gm., bilirubin 0.3 mgm., urobilinogen present in 1:200 dilution of urine, prothrombin time 15 seconds. Electrocardiogram and x-ray of the chest were normal.

Because of the marked balanitis treatment was begun with penicillin 25,000 units every hour to a total of 925,000 units and on March 1, he was started on intensive five-day arsenotherapy receiving 240 mgm. mapharsen daily in 2,400 c.c. of 5% dextrose intravenously. On the first day of his penicillin therapy, he had a febrile Herxheimer reaction with temperature of 101.1°. Thereafter during intensive arsenotherapy there were no reactions. On the sixth day lumbar puncture was performed and, on the seventh day patient was discharged home. At 4.50 a.m. on the ninth day patient was re-admitted with a history of a convulsion three hours previously while at home. He was semi-comatose, moving aimlessly about in bed and no other focal signs were elicited. Treatment with BAL was begun at 5.00 a.m. and at 5.05 a.m. a convulsive epileptiform seizure occurred. At 5.30 a.m. the third convulsion occurred and a fourth at 9.05 a.m. During this first day he received 3.5 mgm./kg. body weight every four hours for four doses and at 6.30 p.m. he first responded to spoken word. BAL was given on three more occasions the following day in the afternoon of which he could recognize people and was definitely recovering. Eight injections of BAL were given. During the coma he was sustained with feedings through a stomach tube.

SUMMARY

Three cases of arsenical encephalopathy are presented, which were treated successfully with BAL. One case was complicated by a severe balanitis for which he received penicillin 925,000 units prior to arsenotherapy. One case had a history of alcoholic indulgence prior to hospitalization.

Tube feeding is suggested as a useful adjunct to therapy. It is more practical and superior to intravenous maintenances of water balance and had the added advantage of supplying food via the natural route.

It is deemed advisable not to begin intensive arsenotherapy in the presence of obvious pyogenic infection nor before the presence of foci of infection has been ruled out.

This report is published through the kind permission of Dr. J. F. Burgess, Chief of the Department of Dermatology and Syphilology. I am indebted also to Dr. A. A. Bailey of the Department of Neurology who saw these cases in consultation.

REFERENCES

1. EAGLE, H.: *J. Ven. Dis. Inform.*, 27: 114, 1946.
2. COHEN, A., *et al.*: *J. Am. M. Ass.*, 133: 749, 1947.
3. TZANCK, A.: *Ann. de dermat. et syph.*, 10: 752, 1939.

INTRA-ABDOMINAL VASELINOMA ASSOCIATED WITH OBLITERATIVE CHOLANGITIS

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The following case report is that of a woman who died from the results of obliterative disease of the biliary passages, apparently initiated by a vaselinoma.

Mrs. E.D., aged 43, was admitted to hospital on September 15. She stated she felt well but had been jaundiced for 6 weeks and had recently vomited a large quantity of bright red blood.

The history of her present illness dated back 7 years. At that time she commenced to have attacks of pain in the right upper quadrant of the abdomen, not associated with jaundice. A diagnosis of gallbladder disease was made and operation was advised. The gallbladder was removed. There were no stones present.

Five months subsequently, she had an attack of pain in the right upper quadrant. This pain was moderately severe and recurred periodically over a period of five months. Towards the end of that time, she began to have chills, fever, and jaundice, associated with the pain. Abdominal exploration was advised and her surgeon reopened the abdomen and explored the common

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bile duct. Except for dense adhesions in the area, there was no evidence of disease. Her convalescence was more or less uneventful until several months later when she began to have recurring bouts of chills, fever and pain in the right upper quadrant, associated with jaundice. These attacks came on, at first, every four or five months, but the time interval between them decreased until during the past year the bouts recurred every two or three months. She had vomited large quantities of bright red blood on several occasions during the past two years.

About six weeks prior to the present admission, she had an attack of pain in the right upper quadrant and associated chills, fever, and jaundice. The symptoms subsided but there has remained a fluctuant jaundice of moderate severity.

Physical examination revealed a thin, alert, rather worried-looking patient. She was slightly jaundiced. Examination of the head, neck and thorax and the cardiovascular system and extremities was essentially negative. The abdomen was moderately distended with a caput medusæ type of vein formation in the region of the umbilicus. There was an old healed upper right rectus incision scar. The spleen was greatly enlarged and its outline could be seen protruding downwards. Her liver was firm and nodular, and extended about four finger-breadths below the costal margin. The flanks were dull to percussion, suggesting the presence of ascites.

Her hæmoglobin was 39%, red blood cells 2,190,000, colour index 0.90. White blood cells were 4,000, polymorphonuclears 44%, lymphocytes 52%, monocytes 2%, eosinophiles 2%, platelets 87,600; clotting time 3½ minutes, bleeding time 4 minutes. Sedimentation rate was 39. Van den Bergh was biphasic in reaction and was 6.25. Total serum proteins 3.9 and non-protein nitrogen 2.6. Fasting blood sugar was 110. Prothrombin clotting time was 48% of normal. Blood grouping was A2 with a Rh negative factor. Kahn test was negative.

It was thought that this woman was suffering from an hepato-lienal syndrome probably due to chronic hepatitis which might well be secondary to a stone in the common bile duct. In view of the long history, the gross structural damage to the liver and the spleen, and the very poor condition of the patient, operation was considered to be very risky. However, the risk seemed justified under the circumstances and operation was advised in the hope that adequate biliary tract drainage could be established and the way thus paved for any necessary corrective procedure.

Exploration of the right upper abdomen revealed many dense fibrous adhesions effectually barring any approach to the liver. There were numerous large veins present, and bleeding was profuse and was controlled with great difficulty. The operation was terminated when the condition of the patient began to show signs of deterioration.

Her postoperative condition was more or less satisfactory. On the 25th day after the operation, however, she began to have frequent chills with fever of 104.6° F. The jaundice deepened and she had repeated attacks of hæmatemesis. Death occurred three days later.

Post mortem examination revealed no remarkable change except in the abdominal cavity. There it was found to be virtually impossible to separate the dense adhesions in the tissue underlying the operative site on the anterior abdominal wall. They were especially dense in the site of the old gallbladder bed. This overgrowth of fibrous tissue had obviously involved the hepatic and common bile ducts to such an extent that their actual location was a matter of extreme difficulty. The walls of the common and hepatic ducts were between 2.0 and 3.0 centimetres in thickness, this due again to the dense fibrosis of the duct wall. The ducts were patent, but the lumina were so minute in places that it would appear unlikely that bile could have gained passage through them. There was a moderate amount of biliary gravel in the common bile duct.

A cystic structure about the size of a hen's egg was found lying in the region of the common bile duct abutting on the visceral surface of the liver at the base of the old gallbladder bed. This cystic structure had a thick-walled fibrous capsule which, on being opened, was found to contain vaseline. Microscopically, the wall of the cyst showed a typical picture of the so-called paraffinoma characterized by very heavy, old and new fibrous tissue stroma with many giant cells of the foreign body type scattered throughout the tissue.

The liver was enlarged, green in colour, coarsely nodular in contour, firm in consistency and weighed 2,060 grams. The intra-hepatic portion of the hepatic duct was widely patent. It was apparent that there were two types of cirrhosis present, the first of the portal and the second of the biliary type. This was confirmed microscopically. The spleen was enlarged and weighed 790 gm. The pancreas and pancreatic duct were not especially noteworthy. The stomach was found to contain at least 1,000 c.c. of blood and there was approximately twice this quantity in the remainder of the gastro-intestinal tract. The stomach was considerably dilated and was thick-walled and there were many large œsophageal varices present in the vicinity of the cardiac orifice.

COMMENT

This case is presented to again draw to the attention of the surgeon the sometimes deleterious effects of certain hydrocarbons on the organs of the abdominal cavity. It has been recognized for years that the subcutaneous injection of paraffin to remedy hernia, prolapsing hæmorrhoids, facial defects and sagging breasts would at times cause an excessive fibroblastic reaction resulting in a characteristic tumour named a paraffinoma by Benedek (1913). That these tumours could occur in the abdominal cavity has not been so generally recognized.

Vaseline, paraffin, cosmolin and petroleum jelly are all more or less synonymous names for a mixture of hydrocarbons of the methane series.

Each of these substances can cause a fibroblastic tissue reaction. In the abdominal cavity, these substances have been employed from time to time for varied reasons such as the prevention of adhesions, the promotion of drainage, and to prevent packing from adhering to tissues. Cruikshank[1] reported a case in which intestinal obstruction developed secondary to a paraffinoma. The paraffinoma resulted from the use of liquid paraffin in an attempt to prevent the development of adhesions after an abdominal operation. McKechnie[2] had a similar experience after using ordinary vaseline for the same purpose. At the second operation he found multiple vaselinomata throughout the abdominal cavity, resembling in appearance a generalized carcinomatosis. Excision and biopsy revealed the real nature of one of the tumours.

In this patient it is presumed (no satisfactory records of the previous operation could be obtained) that the operating surgeon used vaseline in the gallbladder fossa of the liver in an attempt to prevent adhesions. Instead of preventing adhesions, the introduced hydrocarbon initiated a sequence of events that led to the prolonged illness and eventual death of the patient.

REFERENCES
1. CRUIKSHANK, A. H.: Paraffinoma of the peritoneum, *The Lancet*, 1: 4, 1941.
2. MCKECHNIE, R. E., SR.: Verbal communication.

SPECIAL ARTICLE

THE DISAPPEARING CARIBOU

Robert F. Yule, B.A., M.D.*

The Pas, Man.

In venturing to write on this subject I realize it may be considered only as one man's opinion. Nevertheless it seems to me that the question of the survival or otherwise of the "Northern Deer" is one of vital interest to every Canadian and not just to the comparative few who depend upon them for their livelihood. As a matter of fact, we appear to be witnessing the waging of a losing battle for survival by the last large herd of caribou on the North American Continent.

In my opinion, under present conditions, the caribou in a very short time will have ceased to be a major factor in the economic life of those whose existence is built around this hardy migrant. In a surprisingly short time these animals have disappeared completely from large districts. In 1918 at Fort Chimo on the Ungava Peninsula there were large herds of caribou and yet three years later there was not a single one to be seen. There is no reason to suppose that history will not repeat itself here.

My reasons for reaching these conclusions are twofold. First, considered and informed opinion of oldtimers, scattered across the area of which I write. Amongst these is James Cumines, a game warden of many years' standing, and Father Egenolf. The latter, with his forty years of continuous residence at Brochet, should speak with authority. They agree that there are not half the deer there were a few years ago. Formerly they could be found in all directions from the Post, but now if reported in the east there are few if any in the west; if in the centre, then few elsewhere, but always the story is the same.

The Caribou in his native habitat.

Second, my personal observations: these cover only the last six years. This past winter my work has been done by plane. It has carried me on the east from York Factory, where the salty waters of the Hudson's Bay mix with the fresh water of the Hayes River, to Brochet on the west, where the Cochrane River empties its barren land water into island-studded Reindeer Lake, and north into the Barren Lands. These trips have enabled me, not only to see for myself, but have afforded an excellent opportunity to discuss the question with reliable observers in all sections visited.

On these trips it is quite true that I have seen a lot of caribou, but no really large herds. Where they used to be seen in hundreds, now they are seen in tens, and in large areas no animals are seen at all. I have taken into consideration that in winters of heavy snow, such as the past one, the caribou are inclined to stay more in the bush and thus are not so easily seen. The difficulties in estimating the numbers of caribou in the past have been the limited areas

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from which the conclusions are drawn. For example, this year, if one only visited the eastern area between Churchill and Gillam, one would report herds of considerable size. There are no doubt large numbers here, but no multitudes. However, when you travel over the centre and western districts and see large areas with no caribou, and in no cases any large number, the picture as a whole is vastly different.

Ernest Thompson Seton in his book *The Arctic Prairies,* writing of his observation of the caribou east of Great Slave Lake in 1907, has this to say,—"This then, is my summary of the Barren Ground Caribou between Mackenzie River and Hudson's Bay. They number over thirty million and may be double that". I think that all would agree that Mr. Seton is a reliable observer. He considered that in spite of the white man's high-powered rifle, they were not getting less and might even be on the increase.

P. G. Downes in *Sleeping Island,* 1941, makes the following comment on Mr. Seton's estimate of ten to fifteen deer as the annual native kill around Fort Resolution:

> "When one considers the case of the Idthen-eldelei who pass the entire winter literally among the caribou, and further not only the winter, but the spring and fall, when the latter are bunched up in herds; when one further realizes that they feed not only themselves but their dogs almost exclusively on caribou, the average kill rises much higher and approaches figures in the neighbourhood of hundreds per family."

I may say that my own observations and enquiries lead me to agree with Mr. Downes. This winter I talked with an Indian who speaks English, Cree and Chipewyan. He told me that in the last week he had killed twenty caribou. I enquired as to his probable kill in a winter (not a year). He was, of course, rather vague but said "For sure two hundred". This man, however, is a bit above the average in hunting ability, but, in view of what other experienced hunters have told me, I would suggest that this is an under rather than over estimate. I am told that a man with a good rifle within range of a band of caribou can shoot the whole lot, as when one falls the others run a little distance then return to smell their fallen comrade. This goes on until the last one has fallen.

What then are the reasons for the diminution in numbers of our northern life-saver, the caribou?

First, indiscriminate slaughter by the residents in the areas through which these over-antlered animals migrate. In the majority of cases the blame is placed on the Indian, who will not answer back. It is quite true that the Indian and Eskimo is not, never has been, and probably never will be, a conservationist. However, from my own observations, I am prepared to go further and say neither is the white resident nor his grudgingly tolerated relative, the Metis, in any sense of the word a conservationist.

Second, dogs. It is quite a common thing these days to see articles commenting on the disappearance of the dog as a beast of burden in the north. In certain places this is true, but it does not apply, and perhaps never will, to the greater part of the territory under discussion. The dog is essential for travelling and especially necessary in visiting far flung trap lines. Every northern camp one visits is filled with dogs, which, to the eye of an outsider, appear to be greater in number than actually required. When you consider that a team of six dogs will eat half a caribou a day (a caribou weighs approximately 75 pounds dressed) it is easy to see that more animals are killed for dog feed than for human consumption.

Third and last, but not least, we have the wolves. These are no skulking prairie coyotes, but wolves that look like yearling colts. They live on the deer the year around, following them south on their winter migration and still on their rear when they return to their summer home in the barren lands. The traders tell me that the havoc created amongst young calves is appalling.

Just what does the disappearance of the caribou mean to Canada as a whole and to residents of the far north in particular? In the first place the disappearance of our wild life, be it fowl or animal, is a major tragedy and one which we have seen and continue to see much too often. Our Canadian north has now within its boundaries the last big herds of caribou on the North American Continent. Are they too going to disappear? If they do Canadians as a whole are the losers.

In the narrower field, their disappearance means a complete change in the mode of living of several bands of northern Indians, and inland bands of Eskimo. These people live on the caribou the year around, eat their flesh, dress in and sleep on their skins and in some cases their tents are made of caribou skins. They furthermore depend on this animal to feed their dogs, which are their sole means of winter transportation. In fact, their entire life is built around the caribou, and, if they fail to appear at the usual time, disaster is frequently the result.

The bright spot in the picture is the fact that the Government and the public in general are beginning to awaken to the danger of the complete disappearance of these animals. Recently in one of the daily papers there was a news item stating that certain parties had been fined for killing caribou for dog-feed. Generally speaking caribou is used for dog-feed because it involves less work to kill a caribou than to put down a net and catch fish, of which there appears to be an abundance even in the unnamed lakes of the Barren Lands.

Every effort of our Governments and also of local individuals to discourage the wanton destruction of these northern lifesavers is a step in the right direction.

CLINICAL and LABORATORY NOTES

THE DANGER OF THE USE OF SO-CALLED UNIVERSAL DONORS

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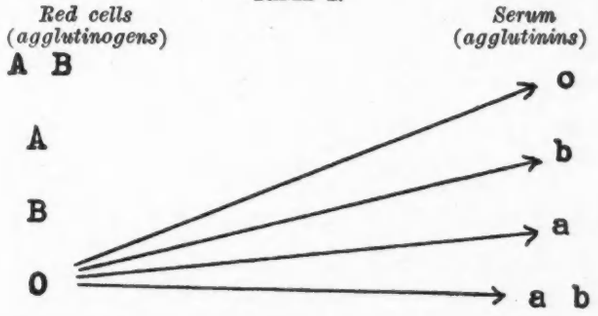
By "universal donor" we generally mean an individual whose blood can be tranfused without damage to the recipient, whatever may be the blood group of the latter. This term, widely used nowadays, seems to be the expression of a truth which bears no exception. For this reason it has greatly contributed to create

TABLE I.



in the mind of medical and non-medical people a sense of security which should not be overemphasized.

The universal donor is that individual whose red cells possess neither the A nor the B agglutinogens. In other words, the red cells of this individual are not agglutinated by the a and/or b agglutinins present in the serum of some receivers.

As the main danger of a blood transfusion lies in the agglutination of the red cells of the donor by the serum of the receiver it is easy to understand, as shown by Table I, why the individual of blood group O is called a universal donor.

Unfortunately, this table which can be found in most publications dealing with blood transfusions is incomplete. First, it does not describe the sub-groups, a point of interest but one which we do not intend to discuss here; secondly, it does not mention the possible presence in the serum of some individuals of blood group A^1B, A^1 and B of a special agglutinin now termed agglutinin "a^2" or anti-O.

As early as 1926, Landsteiner and Witt,[1] Landsteiner and Levine[2] called attention to this agglutinin, which has the property of clumping the red cells of group A^2 in 95% of cases and the red cells of group O in 100%.

Table II, a reproduction of War Memorandum No. 9, published by the Medical Research Council, London, is much more complete than the first mentioned, since it describes the blood groups, the sub-groups and some extra agglutinins, one of them being the agglutinin "a^2" or anti-O with which we are concerned in the present paper.

This a^2 or anti-O agglutinin, which is very rare indeed, (we have found it only twice in several thousand bloods examined), is all the more dangerous as we often forget or ignore its existence. However, it is very easy to detect its presence by performing direct major crossmatching, a procedure which should never be omitted, whatever may be the blood group of the donor and that of the receiver.

The following case is an illustration of these facts.

Mrs. B., of blood group A received at a few days' interval two blood transfusions of group A blood, controlled by the direct major crossmatching. No untoward reaction was observed. Some days later, the patient's condition required more blood. At the moment the blood bank could not supply blood of group A, and group O blood was selected for the transfusion. However, before delivering the blood to the ward a direct major crossmatching was performed, which, to our astonishment, showed strong agglutination of the red cells of the "universal donor" by the serum of the patient.

Different group O bloods were then examined by the same technique, with the same results, *i.e.*, agglutination of these group O cells by the serum of the patient. We then suspected the possible presence of the a^2 or anti-O agglutinin in the patient's serum and to ascertain this point we determined the sub-group of the patient. This latter was of sub-group A^1. Having no corresponding blood on hand we decided to give plasma as a substitute. The next day however, the blood bank being stocked with A^1 blood this last variety of cells was transfused to the patient without untoward reaction.

TABLE II.

Group and sub-group	*Reacts with agglutinins*	*Agglutinins usually occurring in serum*	*Agglutinins (possible extra)*
A_1	$alpha_1$ and alpha	anti-B (beta)	anti-O ($alpha_2$) (very rare) reacts with 95% of A_2 and all O cells
A_2	alpha (always) anti-O ($alpha_2$) (95% of cases)	anti-B (beta)	$alpha_1$ (1 to 2%) reacts with A_1 and A_1B cells
A_1B	$alpha_1$, alpha and beta	None	anti-O ($alpha_2$) (very rare) reacts with 95% of A_2 and all O cells
A_2B	alpha and beta: seldom if ever, with anti-O	None	$alpha_1$ (25 to 30%) reacts with A_1 and A_1B cells
B	beta	anti-A *i.e.* alpha and $alpha_1$	anti-O ($alpha_2$) (very rare) reacts with 95% of A_2 and all O cells
O	anti-O ($alpha_2$)	anti-A (*i.e.* alpha and $alpha_1$) anti-B (beta)	None

Though rather short, this case history permits some comments. With many others we have always insisted on the importance of direct major crossmatching before each transfusion. The case reported here is an illustration of the necessity of such a test. Without this control we would have given group O blood to the patient and a fatal issue might have been the result of such a procedure.

Besides, the term "universal donor" should be discarded on account of its misleading interpretation. If we consider the proper meaning of the words, there is no such thing as a "universal donor"; there are individuals of blood group O who, in the great majority of cases, can give their blood to all other individuals without damage, but we never know, unless we look for it, if the serum of some of these recipients does not possess by chance this a^2 or anti-O agglutinin which will agglutinate the red cells of the so-called universal donor and cause perhaps the death of the receiver. Once more, the best way to find out is to look for it by performing a direct major crossmatching.

REFERENCES

1. LANDSTEINER AND WITT: *J. Immunol.*, 11: 203, 1926.
2. LANDSTEINER AND LEVINE: *J. Immunol.*, 12: 441, 1926.

MEN and BOOKS

JOHN SINCLAIR McEACHERN

T. C. Routley, M.D., F.R.C.P.[C.]

Toronto, Ont.

It was in 1920, in Vancouver, that I first met Dr. John Sinclair McEachern. As I entered the room where a small group of doctors were attending a business session of the Canadian Medical Association, I was attracted to the speaker who, in clear, crisp and concise language, was pointing out the necessity for the Canadian Medical Association to make every effort to resuscitate itself following the weak condition into which he felt it had fallen during the days of the recent war.

A year later, in the City of Halifax, it was the same John McEachern who perhaps more than any other one man, stepped into the breach to save the Association when its future appeared to be precarious, to say the least. The Association was taking stock of its position. It was disclosed that it had but a few hundred members, practically no assets and approximately $14,000 of liabilities. The suggestion was made that it disband. McEachern was on his feet in a flash. He deplored any such suggestion, and, as is so often the case under the circumstances, found himself appointed chairman of a committee of one with power to add, to consider the situation and bring in a report. The following day, McEachern suggested a plan for the rehabilitation of the Canadian Medical Association. His ideas, which called for doubling the annual fee and floating a $20,000 bond issue, were adopted and, from that day to this, the Association has marched steadily forward.

Again, in 1934, while President of the Association, it was John McEachern who undertook to cross Canada, visiting every Division, to urge that the time had arrived when the Provincial Medical Associations should federate under the banner of the Canadian Medical Association. His home province of Alberta was the first to enter federation, which was a very real compliment to the faith and confidence which his own people had in him. It was a long hard pull but federation became an accomplished fact which has since proved to be of inestimable value to organized medicine in Canada.

In 1937, it was John McEachern who persuaded the Canadian Medical Association to establish a Department of Cancer Control and to proceed with the organization of a Canadian Cancer Society, over which Society he had the honour to preside until a year or so ago when his long and serious illness forced him to retire.

One could continue to recount many other instances of John McEachern's deep and abiding interest in the affairs of the medical profession of Canada. When future histories of Canadian Medicine are written, no man in the profession will be shown to stand above him in the quality of his service to his fellows.

In 1938, in recognition of his many notable achievements in the broad field of the humanities, the Association awarded to him the Frederic Newton Gisborne Starr Medal, the highest honour which it can bestow upon a member.

Those of us who knew him well are grateful for the inspiration which he gave us. In judgment, he was shrewd and sound. In patience and tolerance, he abounded. In ability to conceive and carry through a project, he was brilliant and tireless. In bull-dog tenacity where he knew he was right, he never wavered. In his deep love and affection for his fellow men, he rejoiced to render deeds, not lip service. It is too soon to estimate the full value of McEachern's contributions to Canadian Medicine and to Canada, but he is now known and will be known in future days as one of Canada's outstanding medical statesmen. In the immortal words of John McCrae, it seems to me I can hear him say:

> "To you from failing hands we throw the torch.
> Be yours to hold it high."

He certainly held the torch high and carried it far. Those of us who are left to carry on might rest content if we felt we could leave a record approaching that of John Sinclair McEachern.

THE CANADIAN MEDICAL ASSOCIATION

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EDITORIAL

CONTROL OF INTERFERENCE FROM ELECTRICAL APPARATUS

WE have referred in previous years to the subject of radio interference caused by electro-therapeutic apparatus, such as diathermy machines. Actually this matter has been the object of investigation for twelve years. By as early as 1936, interference with radio communications had become so troublesome that control was essential. During the war (December, 1941) notice was given that so far as diathermy machines were concerned shielding would be demanded as soon as metal became available, and January, 1944, was set as the date by which this should be done. The shortage of materials however caused further delay, and finally it was decided to postpone enforcement of the control until January, 1948.

There would therefore seem to have been plenty of warning with regard to the contemplated enforcement of control. But there has been no means of complying with the requirements except with great hardship. The shielding of apparatus is so costly and difficult as to be impracticable in most cases. The replacement with machines of approved wave length involves great expense. Some hospitals have a number of machines, the replacement of which would call for thousands of dollars outlay. Furthermore the new apparatus now available is based on a wave length which we understand is to be changed again at the end of the year. We are informed that this can be adjusted by methods which involve little cost, but it still will mean more trouble.

As it stands then there are regulations in force requiring the control of radiation from electrical apparatus, and there are machines available with new frequencies which conform with these requirements. From the point of view of the Department of Transport, although the changing of the older type of machine will involve expense, the whole matter of radio interference is so vital that it is felt by the Department that control is fully justified. It is pointed out that this regulation has not been directed only at the medical profession. Controls of various commercial types of electrical apparatus and machinery have been enforced for several years and is continuing. Further, it may not be realized that this interference does not affect the household radio to any great extent; perhaps if it did its control would be accepted more readily! It is the higher frequencies used in radio control of aircraft traffic, aids to navigation, police and fire, radio apparatus, etc., that suffer from the interference, and the results can be of serious import. Records are on file of instances in which blanketing has occurred for up to two hours by locally operated diathermy equipment.

The point has been made that whilst the same need for control exists in the United States a period of five years has been allowed for adjustment to the regulations. Apparently, however, radio conditions are somewhat different in the two countries, both as regards the natural static level and the great distances with sparse population. These factors lead to the use in Canada of transmitters of lower power than those commonly used in the United States, and a more rigorous control of interference is therefore necessary. It is felt that a five-year extension would delay the development of other high frequency services of value in economic development.

Some leeway is being allowed in permitting the use of present equipment until it can be replaced or suppressed, provided no essential services are interfered with.

UNIFORMITY IN REGULATING THE DISPENSING OF POISONS

THERE seem to be some strange discrepancies throughout the Dominion in regulations regarding the handling of poisons. Certain drugs come under the Opium and Narcotic Drugs Act, such as opium and its derivatives, coca and alkaloids therefrom, several synthetic drugs similar to morphine and cocaine, and demerol and amidone. Then the Food and Drugs regulations contain an order requiring a prescription for the sale of such drugs as the barbiturates, penicillin and streptomycin, the sulfonamides, thyroid and thyroxin, etc. These however are Federal regulations. The Prov-

inces have their own statutes regarding the practice of pharmacy, and it is in the poison schedules annexed to these laws that the greatest variety is found. For example, in Saskatchewan cotton root can only be sold on prescription; in Alberta it calls for an entry in the "Poison Book", whilst in British Columbia and Ontario it requires the labelling of an ordinary poison, that is, the name of the drug, the word "poison" and the name and address of the seller. Again, some schedules include drugs which are practically obsolete, such as elaterium, conium and verdigris, whilst they omit some new ones that are really dangerous, such as sodium antimony tartrate, stilbœstrol, œstrone, and others. Mr. Linton Davidson suggests* that local incidents may lead to special emphasis in certain cases. Ontario, for example, at one time had a number of fatalities from the drinking of methyl salicylate. That drug calls for a "Poison" label in Ontario and Alberta only. Again, Ontario and Saskatchewan are the only two Provinces to designate potassium bromide as a poison. If it is felt that the "Poison" label is a valuable protection then it may be asked why in Quebec and Nova Scotia this precaution is not required for a single drug. Entry in the poison register only is called for in these two Provinces. British Columbia shows the highest number of instances in which either labelling or recording in the poison book is required.

Another undesirable feature is that new and potent drugs are commonly in use for some time before the authorities place them under control. It is suggested that we follow the plan in force in the United States by which drugs are considered as poisonous whose therapeutic dosage is one grain or less, or a concentration for topical use is 2.5% or less.

It is highly desirable that new drugs should be strictly controlled. To a certain extent the Department of Health and Welfare exercises control of the import of new drugs, but the supervisory power in this respect might be increased. As a matter of fact, these Provincial incongruities are of a legal nature only. In practice, no druggist in good standing would ever sell a poisonous drug without a prescription, nor dispense it without a poison label and proper warning as to its properties. But this is all the more reason why the statutes should be in closer conformity with the best traditions of dispensing practice.

* "Why not a Uniform Poison Schedule", A. Linton Davidson, Ph.C., F.R.I.C., *Drug Merchandising*, January 15, 1948.

EDITORIAL COMMENTS

The Annual Meeting of the British Medical Association

June is the month of annual meetings, as well as of other cheerful occasions. This year will see the renewal in full form, for the first time since 1939, of the annual meeting of the British Medical Association. The scientific sessions of this convention will be held in Cambridge from June 30 to July 2. The President, Sir Lionel Whitby, adds the following note to the general announcement:

"A cordial invitation is extended to members of the medical profession in Canada to attend.

"Although the entertainment will necessarily be on a very limited scale, owing to the austerity conditions prevailing in Great Britain at present, it is hoped that the natural charm of Cambridge will contribute to the success of the meeting."

We appreciate the invitation and would like to express our pleasure on the occasion of the resumption by the British Medical Association of activities so long and so imperatively suppressed.

The Printing of the Journal

In the last two months our printers, the Murray Printing Company of Toronto, have been working under unusual difficulties. A printers' strike which began in December deprived them of a large number of their staff for several weeks, and in addition, the Company suffered a great loss in the death of one of its oldest and most valued employees, Mr. Arthur H. Brookes. For these reasons our *Journal* has been somewhat delayed in appearance, but under the circumstances we feel that the Murray Printing Company are to be congratulated on having overcome their troubles as well as they have done. We hope now to be able to resume production of the *Journal* on the first of each month, as before.

Most cinnamon used as a spice in America is the powdered bark of the cassia tree, which is more pungent than the bark of the true cinnamon tree.

MEDICO-LEGAL

Administration of Anæsthetics

In February, 1947, a member of the Canadian Medical Protective Association was asked by a dentist "to administer gas anæsthesia for teeth extraction in his office. After the pre-anæsthetic examination was done, which included heart, chest, and blood pressure, the administration of anæsthetic was commenced. Four or five minutes of nitrous oxide was administered, but the patient could not be brought below the excitant stage. Therefore ethyl chloride and ether was substituted and an uneventful anæsthesia resulted with teeth extraction in good style." The anæsthetist remained with the patient for a few minutes after recovery.

Two weeks later the anæsthetist received a lawyer's letter making a "claim against yourself and (the dentist) for damages for assault and malpractice arising out of the unauthorized administration of ether to . . . .".

The Association suggested that the anæsthetist reply to the lawyer's letter stating that the anæsthetic given was quite proper and that it was given with all due care and precaution and that he would not accept responsibility beyond that. Nevertheless a writ against the anæsthetist and the dentist was issued two weeks later.

The case, as it concerned the anæsthetist, seemed only to have a nuisance value. As it concerned anæsthetists and the practice of anæsthesia it was important and was recognized as such by the anæsthetists in the district. The head of the anæsthetic department of the hospital in the city where the action was commenced stated it well. Counsel quoted him as saying—"Were the plaintiffs to succeed the whole profession of anæsthesia would be upset, as the basic principle upon which anæsthetists now proceed is that they choose the anæsthetic best calculated to serve the purpose. The decision is that of the doctor, and not of the patient, and he wanted to see that that is established or at least that the challenge to what he calls the 'recognized principle' is fully met and defeated".

Before the case came to trial the plaintiffs made an offer to withdraw the action if a settlement for $1,000.00 were made. This offer was refused. The case came to trial on December 9 before Chief Justice Farris whose judgment was handed down dismissing the action against the anæsthetist and the dentist. In his reasons for judgment the Trial Judge said there had been no breach of contract. "Now we come to tort (a species of civil injury or wrong) and then assault and coupled with that, malpractice". The plaintiff's husband "had made it very clear that what he was interested in was that she (the plaintiff) should be administered a general anæsthetic and not a local one, so that she would not know what was going on."

The judge noted that in a dentist's office restraint during the excitement stage is not applied by a strap as in hospitals "but they hold a person". The evidence showed that, as a result of the holding there were "a few black and blue marks: there is no suggestion of pain from them and it was just noticed they were there". The administration is one continuous operation, "they changed from nitrous oxide to the ether and ethyl chloride all as a part of one operation, and almost immediately after the ether was started the struggling ceased. Where was there any assault?"

A general anæsthetic having been chosen by the patient and gas anæsthesia seeming the best form, the anæsthetist felt he should give nitrous oxide and should supplement it by such other substances as would be, in the circumstances, proper to give to the patient. The implied instruction from the patient is, "You shall use this in accordance with the best medical practice". If more detailed instructions were given, for example, the exact anæsthetic to be used or the pressure under which it was to be administered, the anæsthetist would refuse the case. Here, during the administration of nitrous oxide the patient reached a bluish stage when it is dangerous to continue with that form of gas, "then they continued with a form that was not dangerous, and the operation was completed in a normal manner, as far as proved in this Court, and no damage resulted from the change in the form of gas".

"There was no understanding or agreement, directly or indirectly, that the defendant should use only nitrous oxide and he was not to use ether or ethyl chloride, which are commonly used in an extraction of this kind". Thus when the anæsthetist found it was not safe to continue with nitrous oxide he changed to ethyl chloride and ether, "that being the case I can not find that the defendants were guilty of malpractice, but that they acted in a highly proper manner and according to the best medical practice".

The case was dismissed.

Escape of two kinds there may be; one is essential, the other permissible. The one is the escape from any fetters that would hinder us in our striving; the other is an escape in the sense of a conscious relaxation of effort, a rest and refreshment that energies may be renewed, vision clarified and an ever stronger effort made.—Mervyn Archdall.

ASSOCIATION NOTES

COME TO TORONTO THIS YEAR

Toronto is making extensive preparations for the 1948 Convention. Those who have not been in the city for a few months will notice that many of the streets have been widened; we have even moved a large monument to have everything ship-shape! By convention week the city should be really beautiful with the last of the Dutch tulips, the peonies and the roses!

Many other less obvious preparations are under way: the program is almost completely arranged, many homes have been prepared to

Convention Headquarters—The Royal York Hotel.

receive old friends and to entertain our guests from all over the Dominion. It is hoped that a record breaking attendance will be a feature of this convention.

Non-medical Activities

For those attending the convention who have some spare time for other activities, and for their wives and families who may be with them, Toronto has a number of interesting new features: Among things medical which are new since our last convention, is Sunnybrook Hospital. Not only is it the Dominion's largest, but it is undoubtedly the finest and latest in hospital construction. Working in the magnificent structure, you will find a friendly and hospitable staff who will doubtless be arranging occasions when you may see the whole of this huge enterprise, now nearing completion. Other new hospitals this year are the Wellesley and the Queen Elizabeth, both of them fine examples of their type. If you have not seen them recently, you should pay a visit to the world famous Museums of Anatomy, and of Pathology. If you are historically minded, you may like to visit the scene of the discovery of insulin; the Connaught Laboratories and the Farm are both fascinating places for those who have not seen them, but who are interested in the work of this great institution. The new home of the Academy of Medicine, Bloor and Huron Streets will be open to visitors and is well worth a visit. All the doctors will, of course, be welcome at any hospital activities which may be going on during convention week. If you contact the medical superintendents of the hospitals it is certain that they will be pleased to arrange for you to visit whatever you wish to see.

For those who want to get away from things medical during the Convention a full program of entertainment has been arranged. If you have any other time left a visit to the Royal Ontario Museum will pay dividends. Exhibits are constantly changing and present many features of current interest. A visit to the Art Gallery, to see the permanent collections will be of great interest. Some might like to visit Hart House and to see the art exhibition which will be on display there. No visit to the city would be complete without an attendance at the "Prom" Symphony Concert. The theatres showing English films, of which there are now several, are well worth a visit some afternoon or evening. Besides all this, of course, there are the large departmental stores, and specialty shops of every variety—but perhaps the holders of the purse strings will wish we had not mentioned these!

Out of Doors

For those who want to be out of doors, a score of golf and country clubs surround the city. Several of them have pay-as-you-play facilities, and all are within easy access by bus or motor car from the centre of the city. For those who like racquets, there are many courts near or in the city, to which access can be gained through friends. Swimming in June is not very good outdoors, but there are many facilities for indoor swimming for any who may be interested.

The highways leading out of Toronto are dotted with the most interesting spots to dine, dance or enjoy luncheon or tea. Members of the Ladies' Committee will be able to give expert advice about such places, and directions about how to reach them easily. We would like to remind you that June in Toronto, while occasionally cool, is usually very hot by day.

Every member of the profession in Toronto hopes that the city's facilities will be taxed to the limit during convention week, and that you will find much professional benefit and a pleas-

ant holiday as well, during that period. There is a large WELCOME in our thoughts as we look forward to having you all here from June 21 to 25.

Hotel Accommodation in Toronto for the Annual Meeting

It is by no means too early to be considering the matter of your accommodation for the week of June 21, when the 79th Annual Meeting of our Association will be held in Toronto. In the January issue of the *Journal* you will find at pages 89 and 90 an outline of the available hotels and a form of application for accommodation.

Members are now requested not to ask for rooms at the Royal York Hotel as all allotted accommodation will be required for the members of the Executive Committee, the delegates to General Council and the speakers who will address the Scientific Sessions. It will be acknowledged by all that the members who conduct the business affairs of the Association and those who contribute to the scientific program are deserving of special consideration and for this reason their accommodation at the Convention Headquarters will be protected.

The list reveals many other first class hotels, centrally located, and available to house you in comfort. Please indicate in your application five choices in order of preference and address all communications relative to hotel accommodation to: The Housing Committee, Canadian Medical Association, 135 St. Clair Ave. W., Toronto 5.

To assist with the accommodation of members who will be attending the meeting, the Academy of Medicine, Toronto, has published a notice requesting the Fellows to extend the hospitality of their homes to friends in the profession. When you receive an invitation to be the house guest of a Toronto doctor please accept it as an indication of his desire to make your stay enjoyable and to insure that a record attendance will be accommodated.

Meetings of Affiliated Societies

Notification has been received that the following allied organizations will meet in the Royal York Hotel, Toronto, during the week of the 79th Annual Meeting:

1. Royal College of Physicians and Surgeons of Canada

President—Dr. W. F. Gillespie, Edmonton; Honorary Secretary—Dr. John E. Plunkett, Ottawa.

Monday, June 21 — Executive Committee. Tuesday, June 22 — Council.

2. The Canadian Medical Protective Association

President—Dr. J. F. Argue, Ottawa; Secretary-Treasurer—Dr. T. L. Fisher, Ottawa.

Annual Meeting of the members. Thursday, June 24—Time and location to be announced.

3. Canadian Society for the Study of Allergy

President—Dr. I. H. Erb, Toronto; Secretary—Dr. John Ross, Toronto.

Annual Meeting—Tuesday, June 22, 9.00 a.m. and 2.00 p.m.

4. Canadian Association of Radiologists

President — Dr. Digby Wheeler, Winnipeg; Vice-president—Dr. A. C. Singleton, Toronto; Honorary Secretary-Treasurer — Dr. E. M. Crawford, Montreal.

Sunday, June 20—Executive Meeting. Monday, June 21—9 a.m. and 2 p.m., Meeting of Council. Tuesday, June 22—9 a.m., Meeting of Council; 2 p.m., annual general meeting; 7 p.m., annual banquet.

5. Federation of Medical Women of Canada

President—Dr. Agnes Moffat, Peterborough; Secretary—Dr. Doris Monypenny, Toronto.

Annual Meeting and Dinner—Tuesday, June 22, 7 p.m.

6. Canadian Heart Association

President—Dr. Cecil C. Birchard, Montreal; Vice-president—Dr. John McEachern, Winnipeg; Secretary-Treasurer—Dr. Harold N. Segall, 1538 Sherbrooke St. W., Montreal.

Annual Meeting—Tuesday, June 22, 9 a.m. Scientific Session at 2 p.m. Communications with respect to items offered for the program should be addressed to the Secretary-Treasurer.

7. Canadian Rheumatism Association

President — Dr. Wallace Graham, Toronto; Secretary—Dr. W. S. Barnhart, Ottawa.

Annual Meeting, June 22: 9.30 a.m.—Business meeting of members; 2.00 p.m.—Clinical meeting.

THE CAMSI COLUMN

Jobs for the Medical Student

Our last article (February, 1948) was an appeal specifically directed to the general practitioners of the country. It was there suggested that one method of maintaining a proper balance within the field of medical practice in Canada would be to supplement the students' formal education with periods of apprenticing under supervision of general practitioners. The student would thus gain first hand knowledge of the manner in which these practitioners function in their communities, of the value of such a practitioner to his community, and of the personal advantages and satisfaction to be gained from such practice. Accordingly, interested doctors were urged to contact our national office at the University of Toronto Medical School, and indicate their willingness to accept a student during the summer months.

What is the student's rôle in this plan?

Commencing in March, and continuing periodically to the end of the school year, lists of potential employers will be prepared and circulated amongst the students of all member-university medical schools. Those who wish to apply for a position listed will do so directly to the listed name, and not via the national office. In this manner the arrangements will be completed personally, and hence more satisfactorily for the participants. In considering a position, the student should, of course, include the locale, degree of remuneration, and what will be expected of him in a practical way in his examination of the positions available. When applying he should indicate at what point he is in his formal course, and should mention those things in which he has received instruction and which would be of practical value to his employer, *e.g.*, hæmatology and associated clinical diagnostic methods, etc.

It is hoped that students availing themselves of this opportunity will look beyond the mechanical aspect of general medical practice in an endeavour to discern something of the doctor-patient relationship which is a unique and attractive feature of this branch of medical service.

Although the phase of this employment service that has been described above deserves most emphasis, there will be other positions listed which therefore gain mention here. Summer camps, hospitals, research foundations, provincial laboratories and allied institutions have been approached. Any results forthcoming from these will be similarly listed and distributed.

The success of this new venture will depend greatly on the co-operation of the graduate members of the profession, but will equally depend upon the response of the student body. The students are therefore urged to seriously consider the positions offered, and to take advantage of the valuable assistance offered with them.

D. B. McConachie

MEDICAL SOCIETIES

Physiological Society of the University of Toronto

Sir Henry H. Dale, O.M., G.B.E., F.R.S., recently addressed the Physiological Society of the University of Toronto on "The Physiological Significance of Histamine". The day he spoke was the 40th anniversary of his seeing an experiment in Heidelburg which led him to the study of histamine, and it was the 25th anniversary of his first trip to Canada when he was sent to investigate the reports of insulin discovery. After reviewing his subject Sir Henry raised the question of a synergism of CO_2 and histamine. He mentioned the drugs which are lauded for their anti-histamine action and said "be sure the depressing substance does not suppress physiological action". There is no evidence that anti-histamines interfered with normal circulation. Each of these substances has its own particular minor defect.

The Society was also recently addressed by Dr. G. A. Wrenshall of Banting and Best Department of Medical Research who spoke on "Alloxan Diabetes in the Mammal".

Montreal Medico-Chirurgical Society

The Montreal Medico-Chirurgical Society will hold the following meetings in March:

March 5.—A clinical evening at the Royal Victoria Hospital.

March 19.—Regular meeting: speakers, Dr. Fraser Gurd on "Twenty-five Ways of Getting into Trouble Treating Fractures"; and Dr. B. B. Raginsky on "Psychosomatic Medicine—20 Years' Experience".

Winnipeg Medical Society

Last autumn following a discussion before the Society on the recent epidemic in Winnipeg of virus infections, a resolution was passed by the Society requesting that the facilities of the Dominion Research Laboratory might be extended to Manitoba to enable a proper study to be made of material collected during the epidemic. In response to this resolution Dr. Rhodes, Director of Virus Research, Connaught Laboratories, University of Toronto, addressed the Winnipeg Medical Society at a special meeting on January 12, on "Newer Knowledge of Virus Diseases". He spoke on the elaborate technique necessary to make a differential diagnosis of viruses. He promised that facilities for diagnosis would be available in Winnipeg. At the close there was a lively discussion.

La société médicale des hôpitaux universitaires de Québec

Société médicale des hôpitaux universitaires de Quebec le 21 novembre, 1947.

A PROPOS D'UN CAS DE LEUCÉMIE MYÉLOIDE ALEUCÉMIQUE.—S. Leblond, L. Tremblay et R. Dunne.

Le Capitaine D souffre d'actinomycose de la paroi abdominale pendant quatre ans. Il en présente les premières atteintes en Sicile en 1943. Les Sulfamidés, la Pénicilline, la Radiothérapie, ne réussissent pas à le guérir. Seule la chirurgie parvient à tarir les abcès fistuleux. En janvier 1947, il est pratiquement guéri et en mars 1947, il prend du travail de bureau. En mai 1947, des hémorragies oculaires et nasales sont les premières manifestations d'une leucémie myéloide aleucémique qui se termine par un purpura thrombocytopénique et une hémorragie méningoencéphalique fatale. Le malade meurt le 28 octobre 1947. L'autopsie confirme le diagnostic clinique. Les auteurs discutent: 1°—l'authenticité de l'actinomycose, 2°—les relations possibles entre la leucémie et les traitements radiothérapiques antérieurs. Ils concluent à l'inexistence de ces relations étiologiques. Le malade a été maintenu en vie pendant plusieurs mois au moyen de transfusions répétées, soit 32 transfusions de 500 cc de 100 chacune.

TRANSFUSIONS SANGUINES MULTIPLES.—B. Paradis.

Le sang total a une valeur thérapeutique connue et indiscutable. Avant de donner une transfusion, il y a toute une série de précautions tant scientifiques que simplement techniques à prendre, et ces précautions sont énumérées dans ce travail. Il faut également savoir les différences existant entre le sang frais et le sang conservé, et leurs indications respectives. Pendant la transfusion le transfuseur doit surveiller le receveur. Les quantités de sang à donner: il faut donner autant de sang que nécessaire sans aucune crainte, si l'on se conforme rigoureusement à toutes les données précédentes. Et comme exemple, nous présentons un cas de leucémie aleucémique chez lequel nous avons donné 32 transfusions de sang frais en moins de quatre mois.

STELLECTOMIES.—Cajetan Gauthier.

Nous avons opéré deux malades qui présentaient des troubles dans les membres supérieurs dont un depuis 1918; les deux patients ressentaient des douleurs dans les bras avec troubles vasomoteurs et trophiques importants. Ils ont reçu des épreuves de confirmation du diagnostic par des infiltrations à la novocaine à 1% de leur plexus brachial et de leur ganglion stellaire. Ces épreuves furent concluantes et nous avons pratiqué une excision du ganglion étoilé, du 1er et du 2ème thoracique, avec une partie du ganglion cervical moyen. Nos deux malades sont cliniquement guéris depuis le moment de leur opération.

ONZE CAS DE VAGOTOMIE POUR ULCÈRES GASTRODUODENAUX.—J.-L. Petitclerc.

Transformation de l'estomac du chien grâce à la méthode de Dragstedt et Ellis en une poche isolée et

fermée tout en conservant intactes la vascularisation et l'innervation. Sécrétion moyenne recueillie par aspiration est de 1,100 c.c. avec une teneur de 0.35 à 0.45% en acide chlorhydrique libre. Si l'on sectionne les vagues, la sécrétion tombe instantanément à une moyenne de 410 c.c. avec un pourcentage d'acide libre de 0.11 à 0.32. Technique opératoire: vois transthoracique ou voie transabdominale. Dans les deux cas, les vagues doivent être sectionnés au-dessus du diaphragme. Importance de sectionner toutes les branches des deux nerfs dont la disposition et la forme sont très variables. Soins post-opératoires: danger de dilatation de l'estomac.

MISCELLANY

Notes from India and China

[*We give extracts herewith from a letter received by Dr. M. H. V. Cameron of Toronto, from Dr. J. Y. Ferguson, a medical missionary sent by the Mission Board of the United Church of Canada to report on medical missions. The letter was dated December 5, 1947.*—EDITOR.]

We are this far on our way [South China]. We spent two months in India. We had rather a strenuous time as our plans were cancelled on account of the disturbances and we had to travel by overcrowded trains which were seldom able to run according to schedule. Nobody knows what will happen in India, but the people seem to be expecting Civil War. We had a short visit with Mahatma Ghandi and he seems to be disgusted with the situation. He said that he didn't think his people could stoop so low. It is a beautiful country and very productive, but millions of acres of the best land is left uncultivated to pasture the millions of cows roaming about everywhere at will—in the country, in the parks and even in the main business streets of the large cities. The milk cannot be used as a great many of them are tuberculous. The milk of the water buffalo and goats is used instead. On account of the religious belief of the people no life can be taken, consequently the country abounds in such pests as rats and monkeys which cause great destruction of their food supplies.

The caste system puts hospitals at a great disadvantage as people will not eat the same food or out of the same dishes and even will not eat of the same dishes. This means that relatives of patients have to come with them to cook their food and little kitchens are set up in the hospital grounds. In some cases the nearest relative insists on sitting in the operating room while the patient is being operated on. In a few of the large government hospitals like those in Madras and Bombay they ignore this custom and provide two classes of food only, a meat diet and a vegetable and they can take their choice, but the patients get free food. In the smaller state hospitals and the Mission hospitals they cannot afford this so have to put up with the custom. In spite of these drawbacks there is much to admire in the Indian people and I know, having lived in the Far East, that one cannot get a fair idea of a strange country and not knowing the language, in two months. At any rate we have enjoyed our visit immensely.

There is one thing that has interested me particularly since coming to India, that is the loads people carry on their heads—women especially. I am understating it when I say they carry between fifty and seventy-five pound bundles or jars of water on their heads and walk along quite unconcerned without touching their hands to the load. In fact, besides this load, they sometimes have a bundle on each hip and if they wish to pick up anything off the ground they do it with their toes. I have wondered what effect that had on their spinal column. I discussed it with Dr. Martos and found that he was interested in it. He explains that the resulting hyperæmia caused by the sudden release of the pressure and the suction caused by it tended to an increase in the size of the intervertebral discs and improved the condition of the spine.

He devised a means of producing that hyperæmia without the weight in the following manner: he attached a suspension similar to that used in fracture of the cervical vertebræ, to the head. To this he attached a rope which is drawn over a pulley on the ceiling directly over the chair on which the patient is sitting then over another pulley attached to the side wall, then from this over another pulley suspended from the ceiling directly under the first. By means of this rope the patient can lift himself off his chair. He first takes a lateral plate of the spinal column to make sure that there is no fracture of the vertebræ or spur that might be broken off and the pole must be arranged so that it will be in the vertical direction. The first sitting must only last a few seconds and this is gradually increased each day until the time has reached five minutes daily. In this way he has relieved many painful conditions of the spinal column, and sciatica, which were due to compression and has been successful in treating some cases of cervical rib. One has to be careful in the first attempts as the sudden hyperæmia causes unpleasant cerebral symptoms and the patient must only be raised enough to take the pressure off the coccyx.

Dr. Martos gave me one instance where he treated a missionary who was invalided home because of a painful spine due to compression. He visited India on his way and was treated in this way with the result that he cancelled his passage home and returned to his field. Now I do not know whether this will interest you and no doubt the orthopædic men will be able to pick holes in it, but it interests me from what I have seen here and give it to you for what it is worth.

P.S.—You will appreciate the fact that this letter I am sending to you costs $30,000 in stamps. The other night on the boat I took an American dollar and bought two cups of coffee and a glass of lemonade which cost $9,000. I gave the boy $1,000 tip which he scorned and I got back $85,000 change. J. Y. F. FERGUSON

CORRESPONDENCE

The Convalescent

[*The following extract is from a personal letter to the editor from a prominent member of the Association who is undergoing the painful experience of convalescence.*]

"It is just a month since I left hospital and I have found the process of convalescence as, if not more, trying than illness itself where one's way of life is pretty much in the hands of nurses and doctors and there is little or no individual responsibility on the part of the patient.

"Convalescence on the other hand means a shift of this responsibility back to the individual: nurses are gone, medical advisers begin to think their task over. It isn't and shouldn't be. This is the time when advice, encouragement, conference, allaying of fears and anxieties are most needed in the process of recovery and return to work.

"This is the phase of practice that so-called 'Health Insurance' and the schemes of Voluntary Insurance tend to discourage, as the treatment is largely psychological and visits by the medical adviser are therefore looked on as unnecessary, since no 'active' treatment is being carried out.

"You see I am now speaking as a patient and appreciate the uplift experience when my doctor calls, even if he does nothing more than chat, drink tea (or something stronger) whilst bolstering the morale of the patient with kindness, personal sustained interest in his welfare and so in one way and another allaying disturbing anxieties and apprehensions."

[*Charles Lamb also had something to say about convalescence, but this was long, long before the phrase "Health Insurance" appeared in our language.*]

"To be sick is to enjoy monarchal prerogatives. Compare the silent tread and quiet ministry, almost by the eye only, with which he is served—with the careless demeanour, the unceremonious goings in and out (slapping of doors, or leaving them open) of the very same attendants, when he is getting a little better—and you will confess, that from the bed of sickness (throne let me rather call it) to the elbow-chair of convalescence, is a fall from dignity, amounting to a deposition.

"How convalescence shrinks a man back to his pristine stature! Where is now the space, which he occupied so lately, in his own, in the family's eye?

"The scene of his regalities, his sick room, which was his presence-chamber, where he lay and acted his despotic fancies—how is it reduced to a common bedroom! The trimness of the very bed has something petty and unmeaning about it. It is *made* every day. How unlike to that wavy, many-furrowed, oceanic surface, which it presented so short a time since, when to *make* it was a service not to be thought of at oftener than three or four day revolutions, when the patient was with pain and grief to be lifted for a little while out of it, to submit to the encroachments of unwelcome neatness, and decencies which his shaken frame deprecated; then to be lifted into it again, for another three or four days' respite, to flounder it out of shape again, while every fresh furrow was an historical record of some shifting posture, some uneasy turning, some seeking for a little ease; and the shrunken skin scarce told a truer story than the crumpled coverlid. . . .

"Perhaps some relic of the sick man's dream of greatness survives in the still lingering visitations of the medical attendant. But how is he, too, changed with everything else? Can this be he—this man of news—of chat—of anecdote—of everything but physic—can this be he, who so lately came between the patient and his cruel enemy, as on some solemn embassy from Nature, erecting herself into a high mediating party?—Pshaw! 'tis some old woman.

"Farewell with him all that made sickness pompous—the spell that hushed the household—the desert-like stillness, felt throughout its inmost chambers—the mute attendance—the inquiry by looks—the still softer delicacies of self-attention—the sole and single eye of distemper alonely fixed upon itself—world-thoughts excluded—the man a world unto himself—his own theatre—

What a speck is he dwindled into!"

The Convalescent: Essays of Elia.

CHAS. LAMB

SPECIAL CORRESPONDENCE

The London Letter

(*From our own correspondent*)

AN EAST AFRICAN TOUR

It is probably no exaggeration to say that the only hope of preventing world starvation is the full and immediate development of the potentialities of Tropical Africa as a food-producing area. The magnitude of the task is staggering, but if necessity is still the mother of invention the ultimate outcome is not in doubt. It is yet another of those many challenges which throughout the ages have stirred the pioneering spirit of our forebears and made their name famous from east to west and from north to south. As an attempt to improve the nutritional status of the world the enterprise is of direct medical interest, but it is even more so in so far as its carrying out will demand an immediate development in the medical facilities of the African colonies and dependencies.

Your correspondent therefore welcomed the opportunity to carry out a two-months' tour of East and South Africa for the purpose of acquiring first-hand information of the medical research problems which are facing our administration, particularly in the East African colonies and dependencies. In this letter and the subsequent one it is proposed to give a brief sketch of the situation.

THE SUDAN

The Sudan Medical Service has for long held a high reputation for its standard of efficiency. What first impresses the visitor is how much has been accomplished by so few, but this is quickly followed by a realization of how much has yet to be done. The standard of health of the natives has undoubtedly been raised, and certainly to the casual visitor there is no gross evidence of malnutrition in a town such as Omdurman. The feat of so controlling the pilgrimage to Mecca, which is one of the major health problems in the Sudan, is one of which any country might well be proud. Epidemics are quickly brought under control, and much pioneer work has been done in the treatment of kala-azar. Much, however, remains to be done. Even such elementary problems as surveying the incidence of disease have scarcely been tackled, and even experienced medical officers are only able to give tentative answers to questions concerning this vital point. Problems crying out for investigation, and recognized as such by the men on the spot, have to be ignored because so-called "research" laboratories are inundated with routine duties. Important though the production of vaccines and sera undoubtedly is, by no stretch of the imagination can this be described as "research". And here lies the root of the whole problem—inadequate staff, inadequate funds and inadequate facilities.

KENYA

The same applies to Kenya, though naturally the emphasis is somewhat different. A healthier climate makes for better working conditions, but from the medical officer's point of view this advantage tends to be outweighed by the longer spell of duty he has to perform without home leave. The amenities resulting from the presence of a relatively large European population have to be balanced against the disintegrating effect of this upon native customs and morale. An interesting development here is the proposal to set up health centres throughout the colony which will not only act as dispensaries and hospitals, but will also be centres for investigating the local incidence of disease and the nutritional status of the natives.

Nutrition is a problem of vital importance to Kenya, and one of which only the fringe has been touched. Various official committees have considered the problem, but it is our hope that active steps will be taken to obtain accurate data concerning the feeding habits and the nutritional status of the natives, and at the same time to take steps to ensure that the native takes a reasonable diet. In many parts of the Colony the diet is generally deficient, but particularly so in calcium and first-class protein. To the visitor one of the most obvious queries is as to how much of the chronic ill-health from which so many of the natives suffer, is due to chronic infection, and how much to malnutrition. As in the Sudan, the answer will not be forthcoming until the Medical Service is given the requisite facilities.

WILLIAM A. R. THOMSON

Nairobi, February, 1948.

The Holland Letter

(*From our own correspondent in Holland*)

PUBLIC HEALTH IN HOLLAND DURING 1947

During the year 1947, public health, badly harmed by the war and the occupation, recovered itself and reached the pre-war state, in shorter time than was expected. But two and a half years after the liberation Holland has still to raise battle against two deadly enemies, tuberculosis and the venereal diseases. The mortality from tuberculosis is not higher than in 1939 but the number of cases of tuberculosis, the morbidity, is considerably

more numerous than before the war. There are more than twice as many cases as in 1939. In the sanatoria there are now about 12,000 patients, suffering from tuberculosis, against only 5,000 in 1939. In the dispensaries the number of patients is doubled, compared with 1939. After the war roentgen-control was started in big factories and offices of government and town administration. Some slight cases of tuberculosis have been discovered by this roentgen-examination. The school children in the big towns, like Amsterdam, had been examined too by radioscopy.

Venereal diseases, before the war almost unknown in Holland, are now frequently met, especially in the big towns. The patients are intensively treated and the sources of infection are found out by a special social service.

Infectious Diseases

During the war some infectious diseases like diphtheria increased in number. Before the war 1,200 cases of diphtheria were yearly known in Holland. During the last year of the war more than 60,000 people, not only children but also many thousands of adult persons, were found to be suffering from diphtheria. Though the number of cases of diphtheria is now less than during the war, it still reaches the number of 150 to 200 cases weekly. Typhoid fever was found before the war in 200 cases yearly, in 1947 there were still 500 cases of this infectious disease, but in 1945 there were more than 3,000 cases of typhoid fever.

Scarlet fever, dysentery and poliomyelitis (Heine-Medin) reached during 1947 the pre-war figures, less than during the war. Scabies is still to be found in a great quantity, owing to the scarcity of soap, but hygienic conditions are better than during the war and than in 1945, so scabies is found less than during the last years.

Food

The food-rations are not superfluous, but a sufficient quantity of proteins, carbohydrates and fats are distributed by the government. Fruits, vegetables and fish are, generally speaking, sold without rationing so a real undernourishment does not exist any more.

Though Holland is short of doctors nowadays, soon after the war a great number of students of medicine went to the universities, so after some years the shortage of doctors will have disappeared.

The Development of the Dutch Population

The Netherlands belong to the very thickly populated countries of the world. The population is now a good 9.5 million in 13,200 square miles, or a density of 720 per square mile. This means that the density of the Dutch population is upwards of 16 times the population of the U.S.A. The population is still on the increase and will remain so for some considerable time. For those who appreciate a steady increase of the population of a country, we can say that the net reproduction rate is considerably above the figure 1 during several decades. The increase will go on still for years. The total population is estimated to approach the 12 million mark in 1970.

The high birth rate and the low death rate are the reasons for the increase of the Dutch population. Naturally the unproductive age-groups, both young and old, are present in a high proportion. Nowadays the productive age groups contain only two-thirds of the whole population. But on the other hand, the increasing extent to which the youth of the country is taking advantage of secondary, trade and university education after the compulsory term of elementary education up to 15 years, whilst increasing the education burden, is ensuring a higher productivity for the Dutch people in the future. Between 1930 and 1940 the number of trade school boys increased by about 70%, and the number of secondary school pupils by about 40%. J. Z. Baruch

ABSTRACTS FROM CURRENT LITERATURE

Medicine

The Anatomy of the Pancreatic Ducts. Howard, J. and Jones, R.: *Am. J. M. Sc.*, **214:** 617, 1947.

These workers re-investigated the anatomy of the pancreatic duct and its relationship to the lower end of the common bile duct and the duodenum. They dissected 150 fresh, unfixed autopsy specimens repeating the work of Cameron and Noble by stripping down a small calculus manually in the common bile duct until it became impacted in the ampulla. In 48 specimens they occluded the papilla of Vater with a hæmostat applied from the duodenal surface. After these occlusions coloured fluid was injected into the common bile duct and evidence of reflux into the duct of Wirsung watched for. Following occlusion of the pancreatic duct, fluid was injected into the tail of the pancreas in an attempt to detect the presence of an additional direct connection between the pancreatic channels and the duodenum (duct of Santorini).

In 54% of the specimens following blockage of the ampulla of Vater, the fluid injected into the common bile duct appeared in the pancreatic ducts. A patent duct of Santorini was demonstrated in 36% of specimens. The authors point out that these findings are confirmatory of previous observations but possess the additional feature of being made in fresh and unfixed material. The feature of clinical importance about the study is its support of the theory of pancreatic biliary reflux as a contributor to the onset of acute pancreatitis.

G. A. Copping

Hydrothorax in Congestive Heart Failure. White, P. D., August, S. and Michie, C. R.: *Am. J. M. Sc.*, **214:** 243, 1947.

In the study of the relative incidence of right and left-sided pleural effusion in cases of congestive heart-failure, these authors reviewed the autopsy and clinical records of 100 unselected cases dying of heart failure. The amounts of fluid recovered from the chest varied from 100 to 2,000 c.c. per side, averaging 500 to 600. Unilateral right hydrothorax was more common than left unilateral hydrothorax and in the cases presenting effusion on the left side alone, there was either complete obliteration of the right pleural cavity or, as occurred in one case, infarction of the left lung alone. Only two of fifteen cases with unilateral right pleural effusion had an obliterated left pleural cavity and in only two was there unilateral right pulmonary infarction. Most of the cases (72) had bilateral pleural effusions. In these the effusion was, roughly, equal in half of the cases and predominant on the right in the remainder. (It was of interest that 14 of the 100 cases showed obliterating pleural adhesions and in 12 of these this finding was on the right side.)

The type of heart disease and the side of the heart which showed the greater evidence of failure did not seem to have been of importance in determining the location of the hydrothorax. The authors make no dogmatic attempt to explain the more frequent incidence of effusion or of adhesions in the right chest, although they point out the larger right lung circulation and pleural surfaces and they also refer to the greater tendency for cardiac patients to lie upon the right side as possible etiological factors.

G. A. Copping

The Chemical Components of Onion Vapors Responsible for Wound-healing Qualities. Kohman, E. F.: *Science*, **106:** 625, 1947.

There is probably no other food to which is attached so much legendary history as is the case with the onion, many of which legends have a bearing on physical health. Onion and garlic vapors have been shown to have bactericidal properties. They are lethal to the

white staphylococcus, typhus and a number of other bacteria, and to all protozoa, the latter being killed by an exposure of 1 to 3 minutes. It was found that chewing raw onion from 1 to 8 minutes usually rendered the buccal lining completely sterile. Recent investigations on suppurating wounds exposed to vapor from raw onion paste for 10 minutes showed alteration in the wound colour from gray to rose, subsidence of suppuration, cessation of foul odor and pain and beginning regeneration. An interesting by-product of investigation of the chemistry of onion vapor was the demonstration that the lachrymating principle is present in the distillate but not in the vapor therefrom although the latter had the onion odor. The common experience of the lachrymation when handling raw onions is due to the turgidity and succulence of the onion tissue which, when broken, causes a spray of invisible droplets of the onion juice which contains a thioaldehyde. The propionaldehyde which is in the low-temperature vacuum distillate obtained from onions is probably the bactericidal and phytonicidal substance which is responsible, for instance, for the popular belief in the value of eating raw onions as relief for sore throat, etc. Further investigation of this subject, it is anticipated, will result in the synthesis by the organic chemist of valuable therapeutic agents.

D. E. H. CLEVELAND

Infectious Hepatitis Associated with Pregnancy. Martin, R. and Ferguson, F. C.: *New England J. Med.*, **237**: 114, 1947.

The scanty literature concerning infectious hepatitis in pregnancy is reviewed by the authors who report four cases in detail, although the validity of one case is in doubt since the first symptoms of hepatitis did not appear until 31 days after a miscarriage. One patient delivered spontaneously at term, another had a premature delivery at six and a half months and in the remaining case Cæsarean section was considered necessary because of increasing evidence of liver damage.

It is recommended that gamma globulin be administered as a prophylactic measure to all pregnant women with known exposure to infectious hepatitis. All cases in which the disease develops should be placed on strict bed rest with a high carbohydrate, high protein, low fat diet, supplemented by vitamin concentrates.

NORMAN S. SKINNER

Streptomycin Therapy in 52 Cases of Bacterial Infection. Kane, L. W. and Foley, G. E.: *New England J. Med.*, **237**: 531, 1947.

In 38 cases of pyelonephritis and 2 of cystitis due to Gram-negative bacilli streptomycin effected a cure in 75%, caused improvement in 10%, leaving 15% as failures. Streptomycin was ineffective in cases where the organism had a resistance *in vitro* greater than the streptomycin level obtained in the urine. Acquisition of resistance on the part of an organism during therapy was observed only once. Alkalinization of the urine is considered advantageous and fluid intake should be restricted to 2,000 to 3,000 c.c. per day. Patients were started with a daily dosage of one gram streptomycin given in divided doses at four-hourly intervals. This was doubled if results were not obtained in three or four days. In no case was treatment continued for more than eleven days.

Excellent results with streptomycin were also obtained in two or three cases of non-specific urethritis due to pleuropneumonia-like organisms, two cases of *H. influenzæ* meningitis and one case of *pseudomonas aeruginosa* septicæmia. Two cases of *H. influenzæ* epiglottitis and one patient with lung abscess considered due to the same organism appeared to be benefited by streptomycin therapy. Combined penicillin and streptomycin aerosol treatment of three cases of bronchiectasis in which *E. coli* was the predominating organism in the sputum brought about improvement in only one.

Minor toxic reactions only were observed and occurred in 15% of the series (skin eruptions, fever, pain at site of injection and headache with vertigo).

NORMAN S. SKINNER

Surgery

Pathological Aspects of Death Following Major Surgery. Tanner, F. H. and Cullen, G.: *Surg., Gyn. & Obst.*, **85**: 446, 1947.

Out of 138 deaths following 5,699 major operations, 57 cases coming to complete autopsy were studied together with the clinical records; 51% were emergency procedures and in 77% death occurred within 2 weeks of surgery. The autopsy rate was 50%. Enterostomy was the most frequent operation which terminated fatally. No deaths were attributable to anæsthesia. Operative factors caused death in 15 cases in this order: shock, peritonitis, hæmorrhage, evisceration. Non-operative factors were important in 62 cases: continuation of disease treated, heart disease, pulmonary embolus, other postoperative diseases, preoperative and postoperative diagnosis not made or in error and therefore disease not treated. The latest group included perinephric abscess operated upon for acute intestinal obstruction, mesenteric thrombosis operated upon for acute appendicitis, volvulus operated upon for mesenteric thrombosis, perforated œsophageal ulcer operated on for perforated duodenal ulcer, hepatitis operated on for obstructive jaundice, post-traumatic (fracture of lumbar vertebra) ileus operated on for strangulated hernia. Important incidental findings at autopsy may be of value to the relatives of the deceased, such as the 2 cases showing active pulmonary tuberculosis.

It is suggested that longer delay in an effort to make an accurate diagnosis and for supportive therapy would sometimes avoid a fatality. Multiple elective procedures during one hospitalization seem unwise. One deficiency in hospital records is the lack of a written statement by the clinician after death.

BURNS PLEWES

On Malignant Tumours of the Testicle. Gordon-Taylor, Sir G. and Wyndham, N. R.: *Brit. J. Surg.*, **35**: 6, 1947.

Over 700 patients with primary malignant tumours of the testicle in New South Wales, London and South East England form the basis for this article. Confusion in nomenclature is avoided by referring to two main groups: teratoma and seminoma. Of 688 cases, 67% were seminomata. Chorioncarcinoma formed 1% of the series and all were rapidly fatal. The authors regard the seminoma as a seminal carcinoma rather than an embryonal carcinoma arising in a teratoma. The average age for teratoma is 29 years, and for seminoma is 39 years, but no age, even infancy, is immune.

"Many have arrogantly claimed in conversation or by display in boudoir or bar-parlour the possession of more than man's allotted testicular quota, but the qualifications for admission to their corps d'élite are subject to cold, critical, clinical scrutiny, verification in operating rooms, and confirmation by dispassionate histologists, and few emerge from the stern inquiry with the rank of 'supermen'."

Six clinical varieties are described: (1) The insidious, painless testicular enlargement. (2) The "hurricane" type when the patient is dead in days or weeks. (3) The chronic type with slow growth over two to twenty years, followed by sudden increase in size and metastases. (4) The "pseudo-inflammatory type" which may temporarily subside with treatment by chemotherapeutic agents. (5) A type in which the primary growth remains unobtrusive and metastases, pulmonary, glandular, or abdominal, dominate the clinical picture. Abdominal symptoms, pain in the back, gynæcomasty, rare osseous metastases or sexual precocity may bring the patient to the doctor. Malignant tumour occurred in the undescended testicle in 11.8%

of this series, whereas non-descent occurs in only 0.23% of the general adult population. In 6 cases, neoplasm occurred in patients who had undergone operations to bring the testicle into the scrotum. Of patients who had bilateral cryptorchidism and unilateral malignancy, 24.6% subsequently developed cancer in the second retained testicle. Several cases are cited in which there was a long period, up to 26 years, of freedom from metastases after orchidectomy and radiation therapy. The operation of election is simple removal of the testicle and radiation. X-ray treatment is today the preponderant factor in any success. The prognosis is based on the histology of the tumour. At the end of 1 year, 45% of teratomata and 39% of seminomata are dead; at the end of 5 years 82% and 47.5%; at the end of 10 years, the figures are 85% and 73% repectively.

BURNS PLEWES

The Surgical Pursuit and Removal of a Metallic Foreign Body from the Systemic Venous Circulation. Davey, W. W. and Parker, G. E.: *Brit. J. Surg.*, **34**: 392, 1947.

A shell fragment, 1" x ¼" x ¼", was located in the left innominate vein and passed, during operation, into the right auricle. During operation on the right auricle it passed down into the inferior vena cava and the right common iliac vein. The patient survived this unique series of surgical adventures.

BURNS PLEWES

Further Studies in Skull Fractures and Brain Injuries. Mock, H. E.: *Am. J. Surg.*, **74**: 502, 1947.

For 25 years the author, a general surgeon, has been gathering material on head injuries from hospital records, personal cases and the literature. It is pointed out that most brain injuries must be treated by general surgeons and physicians. The tendency to treat by "watchful neglect" is disapproved. Unconsciousness was present in 30% of 2,685 cases and carried a mortality of 34.4%, coma showed a mortality of 65%, and dazed, drowsy and stuporous patients had a mortality of 22%. In the 7% who were confused and delirious 23% died and in those 3% with a lucid interval the mortality was 25.5%. The significance of various signs such as deepening coma, slowing pulse and respiration, low diastolic and high pulse pressure, fixed pupils, urinary retention, changing and absent reflexes, œdema of the lungs, and early fever are discussed. The early treatment of shock and associated injuries is emphasized.

Treatment by controlled dehydration and spinal fluid drainage is favourably discussed. Whether and when to operate is often a difficult problem and the author states that (1) early operations are usually fatal, (2) subtemporal decompression is a thing of the past, (3) compound fractures must be debrided, but only after shock is overcome, (4) depressed fractures must be elevated but not often early, (5) extradural hæmorrhage requires immediate operation, (6) acute subdural hæmorrhage should be operated upon later rather than sooner, (7) general anæsthesia is poorly tolerated.

BURNS PLEWES

Ligature of Arteries, with Particular Reference to Carotid Occlusion and the Circle of Willis. Rogers, L.: *Brit. J. Surg.*, **35**: 43, 1947.

This Arris and Gale lecture reviews the history of arterial ligation and presents new work on carotid ligation. Celsus, who lived in the time of Tiberius Cæsar, described double ligature and division of the artery and it is defended as the best method for three reasons: (1) recanalization cannot occur, (2) peripheral vasospasm is prevented by division of the sympathetic fibres, (3) if the ligature slips or ulcerates, there is less danger of fatal hæmorrhage. Division of the accompanying vein is advised only if pulsation of the distal part of the artery is not detected. If possible, the proximal ligature should be placed immediately distal to a large branch. The metabolism of a limb should be lowered by depressing its temperature, and the body temperature should be raised to relax the peripheral vessels. The limb should be kept at rest and at heart level. Transfusion raises the blood pressure and volume. If ligation can be delayed three months, collateral circulation develops and a sympathectomy can be done in the interval.

There is a marked difference between internal carotid and common carotid ligation, the latter being much safer. Electroencephalography may be used to test the effect of carotid occlusion. The accompanying internal jugular vein should not be ligated. Common carotid ligation may be life-saving in leaking intracranial aneurysm (spontaneous subarachnoid hæmorrhage) when repeated lumbar puncture shows that leakage is persisting. The circle of Willis is an anastomosis rather than a distributing station for the cerebral blood supply. If it is necessary to ligate the internal carotid artery, it should be resected distally as far as the base of the skull to remove a blind pocket below the circle of Willis.

BURNS PLEWES

Obstetrics and Gynæcology

Face Presentation. Rudolph, S. J.: *Am. J. Obst. & Gyn.*, **54**: 987, 1947.

A series of 61 face presentations occurring in 34,163 consecutive deliveries in Philadelphia Lying-in Hospital is analyzed. The classification and etiology of this condition are discussed. There were no maternal deaths. There were 12 fetal deaths. However, only four of these deaths occurred in babies normally formed and weighing more than three pounds. Two were due to poor obstetric judgment; one to prolapsed cord; and one to antepartum death, cause unknown. There was a high incidence of monstrosities; five were of the anencephalic type, the other two craniorachischisis. There was almost equal distribution between left mentoanterior, right mentoanterior and left mentoposterior; no explanation for the deviation from the expected incidence is offered.

The prognosis for mother and infant is generally good. The majority of patients can be safely delivered spontaneously or by low forceps. Cæsarean section proved to be the safest method of delivery in those cases in which disproportion was present. Internal podalic version is not being used as often as in earlier years.

ROSS MITCHELL

Cervical Cancer in Young Girls. Speert, H.: *Am. J. Obst. & Gyn.*, **54**: 982, 1947.

Two cases of cervical carcinoma are reported in girls aged 12 and 19 years, respectively. This report includes the seventh recorded case of cervical cancer in girls aged 12 years or under. The salient features of these cases are tabulated. In contrast to the preponderance of epidermoid cervical cancer in adult women, adenocarcinoma is the commonest type of cervical carcinoma in young girls. A theoretical explanation for this difference is suggested. The poor prognosis associated with cervical cancer in young girls in the past may be the results of inadequate treatment.

ROSS MITCHELL

Radiology

Roentgenologic Pulmonary Manifestations of Fatal Histoplasmosis. Holt, J. F.: *Am. J. Roentgenol.*, **58**: 717, 1947.

In recent years, various investigations have suggested that the pathogenic fungus, *Histoplasma capsulatum*, is the cause of certain instances of calcification occurring within the lungs and mediastinal lymph nodes, although final proof of this hypothesis is not yet available. Five cases are reported and the following conclusions are drawn. First, it is evident, in our limited experience, that an antemortem diagnosis of pulmonary histoplasmosis based solely upon roentgenologic findings has not been possible. A quick perusal of the chest roentgenograms

shows that a more diversified group of pulmonary changes scarcely could be found in any disease or group of diseases. Perhaps the most consistent finding has been the occurrence of widespread granular lesions extensively disseminated throughout both lungs. This miliary spread is usually a terminal manifestation, however, and is of little help in diagnosing the early stages of the disease. It has been well established that histoplasmosis and tuberculosis occur together relatively frequently, and there is ample evidence to indicate that both diseases will produce cavitation in the lung. These facts obviously make the problem of diagnosis even more difficult than would otherwise be the case. Although histoplasmosis affects persons of all ages, its relatively high incidence in the fifth, sixth and seventh decades of life makes differentiation from bronchogenic neoplasm a difficult problem for the roentgenologist.

In conclusion histoplasmosis belongs to that relatively large group of pulmonary diseases in which the roentgenologist must be content to identify the presence of abnormality, to determine its extent, to describe a certain feature regarding its appearance, and to offer various suggestions regarding its etiology without arriving at a definite diagnosis. The possibility of *Histoplasma capsulatum* as etiologic agent of chronic pneumonitis should be particularly mentioned when widespread, coarse, granular, parenchymal lesions are encountered. Final diagnosis of histoplasmosis depends upon various laboratory procedures all of which are directed toward identification of the causative organism—a yeast-like fungus characteristically found in the cells of the reticulo-endothelial system. R. C. BURR

Emphysema: An Early Roentgen Sign of Bronchogenic Carcinoma. Rigler, L. G. and Kelby, G. M.: *Radiology*, **49:** 578, 1947.

Obstructive emphysema is an early sign of bronchogenic carcinoma resulting from partial obstruction of a bronchus by the tumour. With the diminution of the bronchial lumen occurring during expiration, there is presented a much greater difficulty for the egress of air than for its ingress during inspiration. As a result, a type of relative emphysema affecting the abnormal lung occurs. The lungs may appear almost equal in aeration or in radiability in roentgenograms made during inspiration. In expiration, however, the abnormal lung retains its air while the normal one is deflated, causing a striking difference in their appearance. The findings are exactly similar to those seen with foreign bodies during the stage of obstructive emphysema. In this situation the diaphragm on the normal side ascends during expiration while on the abnormal side it remains in its inspiratory position. The mediastinum is displaced toward the normal side during expiration as well.

These findings are best demonstrated by roentgenograms or fluoroscopic examination made during expiration. The transition from emphysema to atelectasis as the tumour grows and completely obstructs the bronchus may be readily determined by repeated roentgen examination. Patients suspected of bronchogenic carcinoma but without frank x-ray findings should always be examined in expiration as well as inspiration. When obstructive emphysema is noted, this should lead to further investigation by bronchography, planigraphy and bronchoscopy. R. C. BURR

Dermatology

Occupational Dermatoses (Ergodermatoses). Diagnosis, Disability and Treatment. Downing, J. G.: *New England J. Med.*, **237:** 755, 1947.

This valuable summary is relatively brief and so condensed as to make a satisfactory abstract difficult. All interested in industrial medicine, and especially the general practitioner in the city who perforce faces such problems daily, should read the original. The rapid development of the plastic industry is indicated by the author's comment that while plastics have been made as long as clay has been known, the use of resins resulting from such reactions as those between phenol and formaldehyde, with their industrial hazards, is only 30 years old. Owing to the improved hygienic conditions, education of workers and protective measures employed, those now affected are chiefly new and inexperienced workers. The decreasing popularity of patch-tests and their well-defined limits of usefulness are emphasized, together with the important reminder that the majority of true occupational dermatoses are due to primary skin irritants. In this group history is so clearly indicated that patch-tests are unnecessary. The fact that many primary irritants are also sensitizers receives due attention. It is probably not recognized also that the largest group of occupational dermatoses is among housewives. Some pointed comments on questions asked in insurers' medical reports should be noted. The physician is asked to state whether disability is partial or total, permanent or temporary. Such questions cannot be answered by an unqualified affirmation or denial. The disability from a true occupational dermatosis is never permanent, except for hypersensitivity, because all such dermatitides are curable. The ideal treatment—prevention—cannot be achieved completely because there will always be essential chemicals that affect a certain number of workers. Certain precautions which can be taken, such as labelling such possible irritants or sensitizers, education of the workers, installation of cleansing facilities, can prevent a large proportion of occupational dermatoses. A number of simple and readily compounded formulas for treatment have been included. D. E. H. CLEVELAND

Dermatology—the International Outlook. MacKenna, R. M. B.: *J. Am. M. Ass.*, **135:** 1128, 1947.

The distinguished author who presented this paper as an invited foreign guest speaker before the Section of Dermatology and Syphilology at the 1947 Annual Session of the American Medical Association, divided his survey into two sections: the administrative and clinical outlook. The first was concerned with the rapidly growing literature appearing in journals devoted to basic sciences such as anatomy, physiology, biochemistry and psychology which has a bearing on the activities of the dermatologist, but of which he is in general profoundly ignorant. For this reason, and also because other fields of medicine are seeking to incorporate dermatology in their own purview, industrial medicine being cited as an example, the author envisaged a danger of dermatologists losing their independence in the corporal body of medicine. He suggests that it is time now to establish an international journal to publish abstracts of papers on all subjects which may have a dermatological interest, accompanied by explanatory notes on intricate and technical points by a specialist in the subject concerned, and others by a dermatologist to indicate the application of the work to his own specialty.

Under the clinical heading, the two principal lessons learned from the second World War are stated to be (1) the importance of the prevention of disease and (2) the importance of common dermatoses. When the wastage of man-days, the economic loss and amount of suffering caused by common diseases of the skin, principally infections and infestations, is considered, one is forced to appreciate that in the field of preventive medicine dermatology is at least 40 years behind many other branches of medicine. In the cities and towns of Europe and America, beside the factor of relative economic prosperity there are other major factors which greatly influence the morbidity from skin diseases, for which dermatologists cannot claim any credit. These are provision of facilities in dwellings or convenient municipal premises for maintaining proper personal ablution, washing and cleaning of bedding and clothing, and inculcation of good standards of personal hygiene through numerous agencies and channels such as tradition, custom, emulation, the effects of commercial adver-

tisements and the cinema. (Had the author lived in North America he doubtless would have included the radio "commercial". Abstr.) A liberal provision of cheap, good quality soap is a necessary adjunct to such measures. Surveys by dermatologists among urban and rural communities to determine the prevalent skin diseases in each social group, correlating them with other data such as income, diet and occupation, is necessary. It is considered that pyodermas and the background of the seborrhœic state are fundamental factors in the common skin diseases much more commonly than is supposed. The etiological factors of a clinical nature, of importance in considering preventive dermatology, were given as: (1) genetic, (2) bacterial, fungous or virus, (3) biochemical, (4) psychologic, (5) allergic and (6) nutritional. D. E. H. CLEVELAND

Nitrogen Mustard Therapy in Cutaneous Blastomatous Disease. Osborne, E. D., Jordon, J. W., Hoak, F. C. and Pschierer, F. J.: *J. Am. M. Ass.*, **135:** 1123, 1947.

In addition to its effects on two cases of mycosis fungoides, one of lymphosarcoma involving the skin and one of Kaposi's hæmorrhagic sarcoma associated with Hodgkin's disease, the effect of nitrogen mustard on a case of chronic disseminated lupus erythematosus is also described. There was a dramatic response in the case of the patients with advanced mycosis fungoides, the relief from itching being especially striking. Both cases relapsed within 6 months, death in one case occurring 10 months after treatment. In this disease nitrogen mustard appears to give temporary relief in far advanced disease where roentgen therapy is impractical or roentgen-resistance has developed. In the case of lymphosarcoma response was still more spectacular, for although death occurred 12 days after treatment from intercurrent pneumonia autopsy failed to reveal gross or microscopic evidence of lymphosarcoma. In the case of Kaposi's sarcoma there was no clinical or histological response to either roentgen or nitrogen mustard therapy. The case of chronic disseminated lupus erythematosus had been under observation for 3 years and only one dermatological observer had suggested the possibility of lupus erythematosus, while repeated biopsies had failed to give evidence of this or any other disease entity. The exhibition of nitrogen mustard, using approximately 75% of the usual dosage, was a counsel of desperation, evidently, in a chronic inflammatory dermatosis which failed to respond to all other therapeutic measures. The response to nitrogen mustard was rapid and remarkable, the dermatitis subsiding in 3 months to a few patches of clinically typical circumscribed lupus erythematosus on head, neck and upper limbs, with an accompanying gain in weight. At this time a biopsy was diagnostic of lupus erythematosus. A brief history of the development of the nitrogen mustards, substances analogous to "mustard gas" in which the sulfide radical of the latter is replaced by an amine, for the purpose of combating the effects of "mustard gas", is given. The observation of the cytotoxic action of these substances, producing lymphopenia, granulocytopenia, thrombopenia and varying degrees of anæmia, resembling in some respects the action of roentgen rays, and especially their action on lymphoid tissue, led to their experimental use in the treatment of the various types of lymphomas. D. E. H. CLEVELAND

Tryparsamide Optic Neuritis Treated by 2, 3 Dimercaptopropanol (BAL). Friedenberg, S.: *J. Am. M. Ass.*, **136:** 1072, 1947.

Although many reports have appeared in the past two years of successful treatment by BAL of serious reactions following the use of tri-valent arsenical compounds in the treatment of syphilis, the author states that this is the first reported case of optic neuritis caused by tryparsamide (a pentavalent arsenical compound) treated successfully with BAL. The patient, a man of 49, was inadequately treated in early life for primary syphilis, and was found to have tabes dorsalis with atony of the urinary bladder. For 6 months he was treated with iodobismuthite sodium in courses alternated with penicillin. Two days after the second injection of tryparsamide he complained of symptoms indicating loss of the lower visual fields. There was prompt restoration of normal visual fields following BAL therapy. D. E. H. CLEVELAND

Industrial Medicine

The Effect of Administering a Vitamin Supplement, in Capsules, to Groups of Workers in the Steel Industry. Ivy, A. C., Jung, F. T., Bing, F. C. and Cisler, L.: *Indust. Med.*, **16:** 163, 1947.

In this report the authors present the principal observations made during an experiment designed to determine whether beneficial effects could be detected from the administration of a mixture of vitamins to a group of workers in the steel industry. The observations continued from November 1, 1944 through August 31, 1945.

Two hundred and forty-one steel workers in 15 occupations were divided into three groups, called A, B, and C groups, each worker belonging to the same group throughout the entire experiment. Those in A group belonged to one shift, those in B group to another and those in C group to the third. The shifts rotated. At the start of the experiment Group A received vitamin capsules, Group B, placebo capsules and Group C, nothing. The treatment was reversed during each of three periods. Every effort was made to maintain secrecy in regard to the nature of the capsules received. Data are presented giving the results from two questionnaires, filled in by the workers at the end of the first period of observation, and after the treatment groups had been reversed. The combined results of the two questionnaires indicated that as a group, these workers were not measurably affected more by the vitamin than the placebo capsules. As regards appetite, feeling of well-being and sleeping, they could not tell the difference between the vitamin and placebo capsule. No significant differences in production of groups receiving vitamins versus placebos were demonstrable in any of the occupations.

Although the simple taking of capsules had an apparently favourable effect on voluntary absenteeism, it had none on that due to illness. The evidence, however, leaves no question regarding the morale-improving effect of a placebo capsule or a manifestation of interest in the worker. MARGARET H. WILTON

Canteens in Smaller Firms. Garrett, F.: *Indust. Welfare & Personnel Management*, **29:** 59, 1947.

Recent experience in England has shown the outstanding success of the industrial canteen in the small factory. Today it can be claimed as a link in the chain of good working conditions, better relationships, and through health and contentment, higher output. The author of this article discusses the canteen in the small firm (*i.e.*, firms employing not more than 600) and compares it in certain respects with that of larger units. Tables show for factories of different sizes, the percentage of employees who use the canteen for dinners, examples of the cost and loss per dinner served, and the cash turnover per employee. Figures are given also to show the distribution of work in the canteen from the point of view of time. From the actual examples of turnover given, it can be seen that the sum spent per employee varies in different areas and industries, but does not often exceed, excluding cigarettes, 4/- per head per week in a works canteen, though it is higher in canteens for staff employees. The author quotes an average of 3/6 per head as a good healthy sign and below 2/6 per head as a probable sign of poor food or service. This information can be used as a means of estimating the likely revenue in new canteens or measuring any possible expansion. It is also useful when taking into account the expenditures per head when considering raising prices.

The question of group management is also discussed. Purchasing through a buying association in order to take advantage of wholesale prices, the employment of a catering consultant on a management fee basis, and the sharing of one canteen by several local firms, are all suggestions deserving investigation.

MARGARET H. WILTON

OBITUARIES

AN APPRECIATION OF THE LATE DR. J. R. GOODALL*

The death of James Robert Goodall, scholar, surgeon, scientist and soldier, has removed from the ranks of gynæcology and obstetrics, one of the most distinguished men of our time.

Dr. Goodall was born in Ottawa, 70 years ago. Although a Protestant, he chose to have his early education under the Christian Brothers at Ottawa University, from which institution he graduated as Gold Medallist. He obtained his Bachelor of Arts Degree at McGill University, and four years later, graduated in Medicine (1901) from the same University. Upon completion of these academic studies, he served as intern and later as resident at the Royal Victoria Hospital.

A prolonged period of study in the British Isles and on the Continent brought him into close contact with such masters as Ballantyne, Pinard, Paul Bar, Albarran, Knoor, Bunn and Ludwig Pick. Returning to Montreal he became closely associated with the late Professor J. George Adami, under whose guidance he completed his thesis on Sub-involution, for which he was awarded the degree of Doctor of Science. It is interesting to note that his first draft of this thesis was written in German. In 1912, he was appointed Clinical Professor of Obstetrics and Gynæcology, McGill, in which Department he was actively engaged until some two years before his death, when retiring from teaching, he was made Consultant to the Royal Victoria Hospital. This promotion allowed him to devote more time to research, study and writing, not only on gynæcological subjects but his beloved philosophy.

Immediately on the outbreak of World War I, (September, 1914), Dr. Goodall suspended his already extensive practice and enlisted with the 5th Royal Mounted Rifles. 1915 found him in the front line trenches with his regiment. During the Second Battle of Ypres he was wounded three times. For his bravery on the field of battle, he was mentioned in despatches on two occasions. In 1916, Major Goodall was invalided to England, and after his convalescence was appointed Assistant Director of Medical Services. For his services during this period he was awarded the Order of the British Empire.

At the time of his death, Dr. Goodall was Consultant Gynæcologist and Obstetrician, Homœopathic Hospital, Montreal; Consultant in Charge of Gynæcology, St. Mary's Hospital; Consultant to the Saranac Hospital and the Alice Hyde Hospital, Malone, N.Y. He was a Life Fellow of the American Gynæcological Society, and, as we all know, a member of our own Association.† He was a foundation Fellow of the Royal College of Obstetricians and Gynæcologists; an Honorary Fellow of the International College of Surgeons. Besides, he was a member of all the local medical societies. Throughout his life he was a most prolific writer, and in the bibliography of nearly every aspect of gynæcology and obstetrics, J. R. Goodall's name appeared. His monographs on Endometriosis and Puerperal Sepsis are lasting contributions. Very few realize that he was a pioneer in the development of the blood bank, and few have accomplished more in their time. Always a great student and born linguist, he had a particularly keen appreciation of modern languages and literature. His interests were unbounded, and his love for the humanities may be discerned in all his writings.

He will be remembered by his confrères as a most dexterous and accomplished surgeon, always meticulous to the last stitch. He will be remembered, by those who studied under him, as a man with an orderly and open mind, a vivid imagination and an illuminating teacher. Every worthy student was given encouragement, and in very many instances, he remained anonymous in his financial assistance to students and housemen. He will be remembered by his large clientèle as a considerate and kind physician.

Dr. Goodall belonged to many clubs and societies but his home was his favourite club, where discussions on philosophy and art alternated with music. He leaves his widow—a constant companion, who shared his responsibilities and reviewed his manuscripts; a son and two daughters.

We, in our Association, will miss this immaculate, colourful, military figure, whose interests were so varied and whose accomplishments have so materially fashioned our thinking.

A. D. CAMPBELL

* Written originally for the Proceedings of the American Association of Obstetricians, Gynæcologists, and Abdominal Surgeons.

† The American Association of Obstetricians, Gynæcologists, and Abdominal Surgeons.

Dr. George W. Anderson died on January 14 at his home in Toronto, after a prolonged illness. He was psychiatrist at the Toronto Juvenile Court for the past 27 years, the first psychiatrist to be appointed to a full-time post with a juvenile court in Canada. A leader in child psychiatry Dr. Anderson's ability was recognized in 1926, when he was honoured by the Rockefeller Foundation which awarded him a six months' travelling scholarship in psychiatry. Born in Toronto he received his education at the Model School and at the University of Toronto. Graduating in arts in 1907, he received his medical degree two years later and took postgraduate work in London, England. During the First Great War he served with the Royal Medical Corps in France for four years. A keen yachtsman, he maintained a summer home at Lake Rosseau. He was a member of Old St. Andrew's United Church, the American Psychiatric Association, Delta Tau Fraternity and Muskoka Lakes Golf and Country Club.

Surviving are his widow and three sons.

Dr. Sampson Wallace Arthur died on January 10 in Portage la Prairie General Hospital. Born in Ontario 73 years ago he graduated in medicine from Queen's University in 1903, then began practice in Redvers, Sask. For five years he sat in the Saskatchewan legislature as an independent for Cannington. In 1910 he took a postgraduate course in London. In 1943 he moved from Redvers to Portage la Prairie where he took an active part in the life of the community. Besides his widow, he is survived by a son, Dr. John F. Arthur of Burnaby, B.C., a daughter and a foster daughter.

Dr. Thomas W. Ballantyne died on January 19 at the Private Patients' Pavilion, Toronto General Hospital. He was in his 55th year.

Born at Stratford in 1893, his elementary schooling was received at Stratford Collegiate and he graduated from the medical school of the University of Toronto in 1916. In the First Great War he joined the Canadian Army Medical Corps in 1916 and served with the 43rd Field Ambulance. For several years and up to his death, he was medical officer of the Oxford Rifles. He practised in Kitchener for a year and then came to Woodstock where he had engaged in his profession ever since. He took a prominent and active part in many phases of the city's life. He was an enthusiastic member of the Woodstock Rotary Club for many years and was president of the club in 1936. He was active in Masonic circles, being

a member and past master of Oxford Lodge, No. 76 of this city. He was a member and official of New St. Paul's Anglican Church.

He was a keen horticulturist and was a member for many years of the Woodstock Horticultural Society and served a term as its president. He was interested in music and was a splendid baritone singer, on many occasions leading the sing-song at Rotary meetings and other gatherings. He was a former member of the old Y-Beaver Minstrels of Woodstock and was one of the endmen of this well known troupe.

Another interest of his was the St. John Ambulance Association. He was Divisional Surgeon of Division No. 91 of this organization. He was past president of the Woodstock Medical and also the Oxford Medical Associations. A member of the Canadian Legion branch here for many years he was one of its early officers and was one of the originators of the successful Legion sports days, held annually on Labour Day for several years.

Surviving are his widow, one daughter and one son.

Dr. William J. Barton died on January 5 in the Halifax Infirmary. He was 76 years of age.

Born in Pubnico, Yarmouth County, he took his premedicine at Dalhousie University and his medical course at the College of Physicians and Surgeons of the University of Baltimore. He practised medicine at Pubnico for two years before coming to Halifax where he continued his practice until three years ago when ill health forced him to retire.

His wife predeceased him in 1927. He is survived by three sons and two daughters.

Dr. August Blondal, aged 58, died on January 6, 1948, in Winnipeg. He was a member of the honorary medical staff and the Board of Directors of Grace Hospital. Born in Edinburgh, North Dakota, he lived for a time in Oregon before coming to Winnipeg. He attended Wesley College, Winnipeg, and Manitoba Medical College, from which he graduated in 1913. Seven years later he went to Scotland and England where he did postgraduate work at the Royal Maternity and Samaritan Hospitals in Glasgow and the Society of Medicine in London. Returning to Winnipeg he engaged in practice and in 1930 was appointed Demonstrator, and in 1934 Lecturer in Obstetrics on the Faculty of Medicine, University of Manitoba. Dr. Blondal had a talent for drawing. He was one of a committee who drew up the design for the emblem of the Manitoba Medical Association. His pleasant disposition won for him a host of friends among the medical circles and his patients and in the First Lutheran Icelandic Church of which he was a past vice-president. He is survived by his widow, two sons and two daughters.

Dr. William Henry Butt died suddenly at his home in Toronto, January 10, following a heart attack. He was 62.

Son of Rev. W. H. Butt, a Methodist minister, he was born in the village of St. John, Middlesex County, and travelled a great deal in his boyhood days, his father being subject to the exchange system which was the custom of his church in those early days. He attended schools in Stephen Township, Huron County. He taught school in Straffordville and Lyone until 1907 when he entered the University of Toronto to study medicine.

Graduating in 1912, he practised for a time in North Bay, then at Powassan with connections at Hollinger and McIntyre Mines. He then came to Toronto and after establishing his practice in West Toronto, he enlisted in the First World War with the rank of captain in the C.A.M.C. serving from 1917 to 1919.

Interested in education, through his early experience as a teacher, he was for eleven years a member of the Toronto Board of Education, and in 1939 was elected chairman.

He is survived by his widow, one daughter and one son.

Dr. Pearl Smith Chute died at her home in Toronto on January 12. She first went to India in 1895 and founded the mission hospital, Star of Hope, at Akidu, under the auspices of the Canadian Baptist Mission Board. Dr. Chute was in charge of the Star of Hope Hospital until her retirement in 1920. She was awarded the Kaisar-i-Hind Medal for distinguished medical service in India.

Born in St. Catharines, Dr. Chute was a sister of the late Dr. E. G. Smith, who was the founder of Canadian Baptist medical work in India. She was a graduate of the old Trinity Medical College, Toronto. Since retiring she has lived in Toronto and was a member of Wychwood Baptist Church.

Surviving are a daughter with the Vallore Medical College, India, and three sons.

Dr. Grace Ritchie England, one of Canada's first women physicians, died suddenly on February 1 in her 81st year, at the Western Division of the Montreal General Hospital. Dr. England was born in Montreal and educated at the Montreal High School for Girls, McGill University, Queen's University and Bishop's University. As McGill University had not opened its medical school to women, Dr. England entered Queen's University, Kingston, Ont., and when Bishop's University allowed women to enroll for medicine, she returned to this province obtaining her medical degree there. Before entering the field of medicine she had graduated in Arts from McGill University, and was a member of the first class of women to enter that faculty.

She married Dr. Frank Richardson England, in 1897, who pre-deceased her some years ago. After her marriage she maintained a private clinic and was active in public health and welfare and woman suffrage. She was active in affairs of the International Council of Women and the International Congress of Women and in 1914 was one of the delegates representing Canada at the International Council meeting in Rome. In 1922 she was official Canadian delegate to the Pan-American Conference of Women at Baltimore and in 1930 she was picked by the Liberal party to contest the Federal election in the Mount Royal Division.

She was a member of the Women's Canadian Club, past-president of the Montreal Council of Women and the Montreal Women's Liberal Club and a provincial vice-president of the National Council of Women. In recent years she spent much of her time at her summer home in Knowlton, Que., where her garden and flowers were noted in the neighborhood.

She is survived by her daughter and a stepson.

Dr. Roscoe Reid Graham died on January 17, 1948, of coronary thrombosis while skiing at Collingwood. His colleagues and a host of friends in all walks of life were stunned by the news of his death. He had just passed his 58th year. Dr. Graham was born in the village of Lobo. He graduated M.B., University of Toronto in 1910 and was an intern in St. Michael's Hospital where his unusual abilities were noted by the late Dr. Gideon Silverthorn who encouraged him to study abroad. He did postgraduate work in St. Bartholomew's Hospital, London, Edinburgh, Vienna and Berne. On his return he was made a member of the Staff in Surgery in St. Michael's Hospital. Two years later he became assistant to the late Dr. F. N. G. Starr and joined the staff of Toronto General Hospital. During the First Great War he served as Captain R.C.A.M.C. in No. 4 General Hospital in England.

After the war Dr. Graham's progress toward widespread recognition began. He was probably the youngest clinician ever elected to the Canadian Association of Clinical Surgeons, and he served for many years as its secretary and was a past president of that body. He became a Fellow of the Royal College of Surgeons of Canada and was active in its committees. He was also Fellow of the American College of Surgeons and the Mexican Academy of Surgery. He had the distinction of membership in the American Surgical Association and in the Central Surgical Society. He was a member

of the Editorial Committee of the Annals of Surgery and wrote the section of Surgery of the Stomach and Duodenum in Bancroft's recently published work on the Surgery of the Abdomen. Dr. Graham made numerous contributions to the art of surgery. His work on total gastrectomy, sliding hernia and tumour of the pancreas was original and will ensure his fame in years to come.

As a teacher Dr. Graham was highly successful. A sense of the dramatic made his clinical demonstrations events of interest. He was at his best before an audience of surgeons and had been selected to give the Murphy Oration before the American College of Surgeons at its next convocation. Personally Dr. Graham was of a happy disposition. He never had to suffer jealousy from his colleagues. His enthusiasm was contagious whether at work or in his recreation. His widow, one son and one daughter survive.

Dr. Thomas Willard Kenneth Hume, aged 46, died on January 4 at Auburn Heights, after a brief illness.

He attended Harbord Collegiate and graduated in medicine from the University of Toronto in 1925. After postgraduate work in the Henry Ford Hospital, Detroit, Dr. Hume took up residence in Auburn Heights.

Surviving are his widow, three brothers, and a sister.

Dr. Charles M. Kingston died on February 1 at his home in West Vancouver. He once was Conservative member for Grand Forks-Greenwood Riding in the B.C. Legislature. Dr. Kingston was born in West Huntingdon, Ont., and was a graduate in medicine from the University of Toronto. He was a past grand master of the Grand Lodge of British Columbia, and was a member of the United Church. Surviving are his widow, two sons, and two daughters.

Dr. Camille LaViolette died on December 24 in the Notre Dame Hospital following a short illness. He was in his 83rd year. Born in St. Jerome he attended Laval University and after graduation and postgraduate study he became nose, throat and ear specialist and chief neurologist of the St. Jean de Dieu Hospital. During the First Great War he served overseas with the 22nd Battalion, C.E.F., as medical officer. He is survived by his widow and two daughters.

Dr. Anna McFee, the first woman intern appointed to a hospital on the North American Continent, died on December 20 in her 93rd year. Miss McFee had been an invalid for a number of years and retired from practice at the age of 70. Born at St. Chrysostome, Quebec, she was educated in Montreal and studied medicine at the University of Toronto, graduating in 1897. She then went to Edinburgh and carried on postgraduate studies there, taking her Licentiate at the Royal College of Physicians and Surgeons. At the turn of the century she went to New York, being appointed an intern at the city hospital on Randall's Island. Later she practised medicine in New York for about 20 years, and on retirement returned to Montreal. Although retiring at the age of 70, Miss McFee became a great traveller, not only all over the North American Continent, but in Europe, Egypt and India.

Surviving are a sister, two nieces, and a nephew.

Dr. James H. McGarry died on January 22, aged 76, at the Niagara Falls General Hospital. He was born in Niagara Falls in 1871, and graduated from the University of Toronto and Trinity College 55 years ago. Associated with him in the McGarry Clinic are three of his four sons, all doctors, and graduates of the University of Toronto. During the First Great War, Dr. McGarry was in the Home Military Service. Two of his sons, Dr. John and Dr. George, served with distinction in the Second Great War. Dr. McGarry was the first medical health officer in the City of Niagara Falls and was a coroner for many years. He was a member of the Ontario Medical Association, the British Medical Association, the I.O.O.F. and Christ Church.

Dr. Francis P. McNevin, aged 57, died on January 26 in St. Michael's Hospital. Born in Uxbridge, he graduated in medicine from the University of Toronto in 1916, and shortly after joined the Royal Navy as a surgeon. Returning to Toronto in 1920 he established a private practice and he was on the staff of St. Michael's Hospital. His work with the Public Health Department had been principally with the school boards. Dr. McNevin was a member of the Ontario Medical Association, Blessed Sacrament Roman Catholic Church, Knights of Columbus and the Holy Name Society. Surviving are his wife, three daughters, a sister and a brother.

Dr. Charles T. Mathieu died suddenly at his office in Montreal on December 29, in his 62nd year. A native of St. Roch, Richelieu County, he was educated at St. Hyacinthe College and Laval University. He graduated in 1912. Dr. Mathieu practised in Pawtuckett, R.I., but later returned to Montreal.

He is survived by his widow, a daughter, three sons and a sister.

Dr. James Scovil Murray, formerly of Saint John, N.B., died on January 8 at his home in Vancouver. He was educated at the Saint John High School and at Rothesay Collegiate School, and later graduated in medicine from McGill University in Montreal. He began his practice of medicine in Upham, Kings County, and later removed to Hampton, where he was well and favourably known. He afterward practised in Calgary, Alta., but owing to a heart condition, took up residence in Vancouver, where he practised for a short time prior to his retirement.

Surviving are his widow, one daughter, two brothers and a sister.

Dr. R. C. Novak, aged 44, died in Ponoka, Alta., on January 21. He had been a member of the medical staff of the provincial mental hospital since last October. Dr. Novak was born in Saskatchewan and educated in Saskatchewan and Manitoba. He received his medical degree from the University of Manitoba in 1931, subsequently specializing in psychiatric work. He spent several years on the medical staff of the provincial mental hospital at Essondale, B.C.

Dr. Stewart Urquhart Page, aged 48, died suddenly on January 10 from a heart attack at Toronto Western Hospital. Dr. Page had been on the staff of the Toronto Western Hospital since 1927 and was an associate of the Toronto East General Hospital in charge of cardiology.

Born in Toronto he attended University of Toronto Schools and received his M.A. from the University of Toronto, where he graduated in medicine in 1924. Dr. Page was a member of Hillcrest Church of Christ.

Surviving are his widow, a daughter, and two sisters.

Dr. Omer H. Patrick, aged 78, died in Calgary on January 1. Born at Ilderton, Ont., he graduated in medicine from the University of Western Ontario in 1892. He practised for 20 years at Port Huron, Mich., before moving west. He was one of the pioneers in the development of the Drumheller coal field and was an operator of coal mines there for more than 30 years. Dr. Patrick was founder of the Calgary Zoological Society, of which he was president many years. During his association with the society he originated and played a key rôle in the development of the dinosaur and fossil park on St. George's Island.

He is survived by his widow, a son and a daughter.

Dr. James Reeves, of Eganville, Ont., died on December 16 in his 78th year. He graduated in medicine from McGill University in 1895. A member of the Church of England, Dr. Reeves was a past district deputy grand master of the Masonic Order and a member of Eganville Rotary Club. Surviving are his widow, four sons and a daughter.

Dr. Austin E. Roszell, aged 65, died in Caledonia, Ont., on January 28. He received his M.B. degree in 1911. Surviving is his widow.

Dr. Joseph Nicholas Sankey, aged 47, died of heart disease in Birmingham, England, on December 30. Born in England in 1900, he was brought to Vancouver by his parents when only a few months old and lived here until the age of 12, attending Strathcona School. He returned to England with his family in 1912, and remained there to continue his studies later at the University of Birmingham, when they again moved to Vancouver in 1919.

He is survived by his father, two brothers, and one sister.

Dr. William Saunders, who was well-known in Calgary and district, died on December 30. He had practised in Calgary since 1905.

Le Dr Jos.-Eudore Verret de Loretteville, Que., est décédé le 15 janvier à l'âge de 70 ans. Il laisse sa femme et un fils.

Dr. A. Whiteman died on January 8 at Kingston General Hospital in his 85th year. He practised medicine in Picton for more than 50 years and had received a gold-headed cane from the Bay of Quinte Medical Society to mark the event. He was a life member of Prince Edward Masonic Lodge, a board member of the United Church, and had been an enthusiastic golfer. He served as coroner for Prince Edward County more than 25 years and was also one of the leaders in the planning and building of the county hospital here. Previous to coming to Picton, he practised at Shannonville.

He is survived by his widow.

NEWS ITEMS

Alberta

Dr. R. R. Hogg, formerly of Drumheller has taken up practice in Calgary.

The Provincial Diagnostic Tumour Clinic in Edmonton which was inaugurated in 1941 is serving those patients who are sent by their family physician for investigation of lesions related to cancer. The average day number attending the clinic being 46; the clinic is held on two days of the week. A similar clinic is held in Calgay and more recently the City of Lethbridge has been negotiating with the Government for a similar clinic there. Dr. E. L. Pope, formerly Professor of Medicine at the University of Alberta is the Provincial Director of the Tumour Diagnostic Clinic.

The Oilfields Hospital at Turner Valley has added a new wing to its evergrowing active institution. This new wing will be used by the maternity department. The hospital was opened in 1940 and is giving valuable service to that area.

Dr. Graham Huckell and Dr. O. Rosptup have returned from Chicago where they attended the Annual Orthopædic Society Meeting.

Dr. J. Anderson of East Coulee has taken up practice in Calgary.

The University of Alberta has recently added a number of extensions and buildings in recent months and work has commenced on more buildings on the campus. The West wing of the Medical building has been completed and in full use; the East wing is practically completed and will be in use by the late spring. Plans are going ahead for the new wing of the University Hospital, this particular wing will be occupied by obstetric and pædiatric departments; new laboratory space and departmental rooms are included in the extensive addition. The university library, being built east of the Medical building is well on its way, the foundation having been completed and tenders called for. Plans have been drawn up for the erection of a new hospital for tuberculosis on the campus, along University Avenue. The University Hospital Nurses Home has been occupied for a number of months now and is an excellent addition to the campus, it is joined to the hospital by means of an eighth of a mile tunnel.

Much credit is due the Provincial Government and the Department of Health for the great strides made in the building activities on the campus in recent years and months. Dr. J. J. Ower, Dean of Medicine has done much to stimulate the advancement in the above much needed building program and has received full co-operation from Premier E. C. Manning and his Departmental heads.

At the January Meeting of the Calgary Medical Society Dr. Don McNeill gave a very comprehensive presentation on The Symptomatology of Liver Disease. Dr. W. H. Hill, Medical Health Officer presented a paper on Scarlet Fever.

At the Annual Meeting of the College of Physicians and Surgeons of Alberta, Dr. M. A. R. Young of Lamont was elected as President. Other members of the Council are Dr. D. N. MacCharles, Medicine Hat; Dr. S. M. Rose, Lethbridge; Dr. T. C. Michie, Ponoka; Dr. J. D. Neville, Camrose, and Dr. T. H. Field of Edmonton.

WM. C. WHITESIDE

British Columbia

Recent increases in hospital charges have come into effect in Vancouver and Victoria, so that the daily rate for public wards will henceforth be $6.00—in some hospitals even higher. Semi-private and private wards have gone up correspondingly. Even this does not seem to be enough, as all hospitals report that their daily costs per patient exceed the amounts charged. Recent statements in the press indicate that the B.C. Government intends to increase the grants to hospitals, but records statements attributed to government officials that municipalities will also have to bear their share of the increased costs.

Dr. S. Stewart Murray, medical health officer of the City of Vancouver, stated recently that the public health nurses employed under the Metropolitan Health Board are seeking increases in their monthly salaries. The increase will probably amount to at least $20.00 monthly. There are some 65 nurses on the payroll, of whom 21 are attached to the School Board. It is understood that the object is to advance to the level of payment which is accepted by the Provincial Health Department.

The Victorian Order of Nurses is celebrating its fiftieth anniversary this year, and its work increases steadily, as does its value to all the communities that it serves. Miss Alberta Creasor, Superintendent of the Victorian Order of Nurses in Vancouver, recently gave a report on the activities of the Order in that city. Its work, she stated, has doubled in the past three years. In 1947, the 20 nurses attached to the Vancouver Branch

paid 13,000 visits to chronically ill patients. It cared for 9,088 patients, and 60% of those visited were unable to pay for their care. All educational visits are free. These include visits to prospective and actual mothers.

Miss Creasor pointed out that a great deal of this care should be given in suitable institutions, of which there is a great lack.

The Community Chest of Greater Vancouver contributes 50% of its budget to the Victorian Order of Nurses in Vancouver.

There is a useful moral to be drawn from the experience of a Vancouver dentist recently. This gentleman, a man of recognized integrity and eminent in his profession, was sued by one of his women patients, who charged him with having criminally assaulted her, while she was under the influence of an anæsthetic which he had administered to her in his office for the purpose of extracting a tooth. Fortunately, the court accepted the evidence which was adduced in his favour and acquitted him. This evidence included reference to the well-known fact that a great many patients have from time to time, under similar circumstances, been firmly convinced from their subjective sensations, superinduced by the effect of the anæsthetic, that the doctor or dentist has been guilty of improper, even criminal, behaviour. The court admitted as genuine on her part, the plaintiff's conviction that she had been attacked, but gave it as his opinion that this was simply another case of this same type, and that the operator was guiltless. It is surely a most dangerous procedure, that of administering any anæsthetic to a patient of the opposite sex, without ample protection in the presence of another doctor or nurse, preferably the latter.

Two new societies recently formed in B.C. are the British Columbia Surgical Society, and the British Columbia Society of Internal Medicine. The former is instituting a course of lectures to begin shortly.

The Attorney-General of British Columbia, the Hon. Gordon Wismer, K.C., has recently been investigating the numerous "Health Associations" which have been appearing in almost epidemic form in B.C. So far, three of them have been suspended, one, we believe, permanently. This latter one had very large deficits, and was quite unable to meet its obligations. The other two are also under a similar suspicion. This action on the part of Mr. Wismer is greatly to be commended, as a great many people are being victimized in this way. It is very bad, too, from the medical profession's point of view.

A research laboratory, the only one of its type in Western Canada, we are told, is planned for Shaughnessy Military Hospital in Vancouver. It will feature investigation into prevention of organic disease and studies of tissue structure.

The Postgraduate Course for General Practitioners, sponsored by the British Columbia Medical Association is being held this month, March 1 to 12, at Shaughnessy Hospital, Vancouver. The popularity of the course is shown in the large number of applications to attend it from all over the Province and even from as far as Alberta.

J. H. MACDERMOT

Manitoba

At the annual meeting of the Carman General Hospital Board on January 9, a vote of thanks was tendered to Dr. E. K. Cunningham and to the lady superintendent. There are thirty patients in this 25-bed hospital and an increase in the nursing staff will be necessary.

Dr. H. Coppinger, Superintendent of the Winnipeg General Hospital addressed the Civics Bureau of the Winnipeg Board of Trade at a luncheon meeting on January 16 on the subject "The Winnipeg General Hospital and the High Cost of Living". Dr. M. S. Lougheed, M.O.H. spoke before the same group on January 9 on the tuberculosis survey now being undertaken in the City of Winnipeg.

The first showing in Western Canada of three new health films was made at 8 p.m. on January 26 at the Isaac Brock school auditorium. They were "The Feeling of Rejection", based on the case history of a girl treated in the Allan Memorial Institute of Psychiatry in Montreal; "Mother and her Child", by Ernest Couture, M.D., illustrating prenatal care and the first year of the baby's life, and a colour cartoon illustrating food habits for children. Lieut.-Col. C. W. Gilchrist, director of the information services division of the National Health and Welfare Department of Ottawa, was in charge of the films.

A meeting of the general practitioners of Greater Winnipeg was held on January 21 in the Medical College. It was decided to organize a Section of General Medicine within the Winnipeg Medical Society. The general practitioners feel that there is discrimination against them in appointments to hospital staffs. They also wish to have the clause granting extra pay to specialists removed from the regulations of Manitoba Medical Service. As a result of their protest the regulations regarding practitioners registered with Manitoba Medical Service as specialists are likely to be tightened.

The Winnipeg Electric Company has given free advertising to the tuberculosis survey now being carried on in Greater Winnipeg by having a street car painted in white, red and blue with a striking slogan on each side.

ROSS MITCHELL

New Brunswick

Dr. F. A. McGrand, N.B. Minister of Health was the principal speaker at the opening of the Cancer Diagnostic Centre at the Saint John General Hospital. Dr. McGrand stressed the tremendous amount of free service given to the public by the physicians of Saint John through the years and deplored the lack of appreciation, or even simplest gratitude expressed in return for such service. This same free medical service multiplied in every community in Canada was a contribution to the public welfare not much advertised, not much appreciated, and not recognized by tax authorities in any way as a set-off or draw back as a part of a doctor's cost of doing business. The time lost in public service plus the actual physical effort can be assessed as depreciation in the expectation of life of the average doctor.

Dr. B. A. Puddington of Grand Falls has been seriously ill for some time. It is regretted that no improvement in his condition is reported.

Dr. P. M. Knox, Superintendant of the Moncton Tuberculosis Hospital, was the guest speaker at the January meeting of the Registered Nurses Branch at Moncton. Dr. Knox spoke of newer drug therapy in tuberculosis with emphasis on streptomycin and completed his address with an appeal for greater interest in tuberculosis nursing.

The annual meeting of the N.B. Medical Council was held in the Admiral Beatty Hotel, January 6. Dr. R. W. L. Earle of Perth presided. Many problems concerning physicians from Continental Europe were discussed. Many of these doctors wish to emigrate to Canada. In most cases their degrees and other credentials are difficult to assess or prove; and the N.B. Council is proceeding with great caution. The election of officers provided the following slate. *President*—Dr. A. S. Kirkland, *Registrar-Treasurer*—Dr. J. M. Barry.

At the January meeting of the Saint John Medical Society, Dr. Morgan Jones, chief of the Department of Cardiology, Manchester University, England spoke on "Heart Disease in Pregnancy". A capacity audience was present to listen to this distinguished visitor, whose intimate type of clinical discussion of his subject charmed his hearers. Dr. Morgan Jones has just completed a tour of teaching centres in the United States, surveying the U.S. methods in Cardiology.

Dr. J. G. McCarroll, senior resident at the Saint John General Hospital, has left for England for further post-graduate study in obstetrics and gynæcology.

Dr. G. E. Chalmers of Fredericton has been re-elected to the City Council of the Capital City.

Dr. A. F. Vanwart has been appointed chairman of a special committee of the Alumni of the University of New Brunswick. This Committee has in view a war memorial addition to the University Centre, costing an estimated quarter of a million dollars.

Dr. Chas. M. Pratt has retired from the position of Senior Pension Medical Examiner at Saint John as from January 31. Dr. Pratt has held this position since 1918 and has for long been a most trusted and respected representative of the Pensions Department. His relations with pensioners have always been happy and the many disabled veterans of both Great Wars will long remember the sympathetic understanding and just handling of their problems by this most experienced medical officer.

Dr. Stephen D. Clark, was elected warden of the Municipality of the City and County of Saint John, in January. This is Dr. Clark's second term as Warden.

Dr. D. C. Malcolm, recently resigned from the Medical Board of the Saint John General Hospital, after many years of service on the Surgical Staff, was recently appointed to the Board of Commissioners of the Hospital.

Dr. A. L. Donovan, of Saint John is the new president of Saint Patrick's Society. He succeeds Dr. R. T. Hayes in this position.

A. STANLEY KIRKLAND

Nova Scotia

Following a survey by the Rockefeller Foundation and the Association of American Medical Colleges' representatives conducted last October, the Dalhousie Medical School has been continued in its Grade A Rating with many favourable comments made on its progress since the last survey.

The citizens of Louisburg in search of a physician were for a time hopeful of securing Dr. N. J. MacLean of Port Hawkesbury. However, the citizens of Port Hawkesbury and vicinity learning of this circulated a petition asking him to remain with them which he has decided to do.

Dr. D. M. Archibald has gone to Bear River where he will take over the practice vacated by Dr. J. H. Slayter who has moved to Halifax.

Dr. T. W. MacLean of Westville has been re-elected president of the Pictou County Children's Aid Society. This group has been doing a splendid piece of work. They have an ambitious program in which a high degree of interest is being maintained.

Emergency plane flights are becoming more common this winter in Nova Scotia where there has been an unusually heavy fall of snow. Recently Dr. E. J. Gordon of Amherst faced by impassable roads reached his patient by air in fifteen minutes.

At a recent meeting of the Executive Committee of the Medical Society of Nova Scotia a committee headed by Dr. N. H. Gosse of Halifax submitted a report advising a plan of prepaid medical care for Nova Scotia, using the Ontario plan as a model, be proceeded with as soon as possible. The report was adopted unanimously and the committee instructed to proceed with the details of the plan, making modifications suited to the peculiar needs of this Province. It was suggested that New Brunswick and Prince Edward Island be invited to participate in the scheme. This committee will report at the annual meeting of the Society to be held at Keltic Lodge next autumn.

Dr. F. R. Davis, Minister of Health and Welfare has announced a capital grant by the Province of $100,000 towards the establishment of a blood donor service in Nova Scotia in conjunction with the Canadian Red Cross.

Dr. C. W. Bliss of Amherst who has been medical health officer of that town for more than forty years has resigned. His resignation was accepted by the Town Council and a letter of appreciation for his outstanding service authorized. Dr. Bliss, who graduated in medicine from Jefferson sixty-eight years ago, still enjoys a measure of health and vigour remarkable at his age and particularly gratifying to his confrères and many friends.

Dr. R. R. Prosser whose home was formerly in Yarmouth but who was attached to the Indian Medical Service until its dissolution, is now a member of the Division of Psychiatry of the Department of Health and Welfare.

So far as Nova Scotia is concerned, February 5, 1948, marks its centenary of surgical anæsthesia, for on that date one hundred years ago a thumb was amputated in the City Poor House of Halifax under chloroform anæsthesia. This chloroform was made by James D. B. Fraser of Pictou, Nova Scotia, chemist.

H. L. SCAMMELL

Ontario

A conference of secretaries of local societies occupied two half days on January 30 and 31 coincident with a meeting of the Board of Directors of the Ontario Medical Association. Members of the board attended the conference and joined in the discussions. The agenda included the proposed enlargement of the present scheme of providing speakers at the meetings of the societies, a revision of the schedule of fees and a report from Physicians' Services Incorporated. Dr. Watson answered criticism of the forms of agreement to practise under the plan by stating that P.S.I. was owned by the doctors and its regulations could be modified on demand. The conference was well attended and was marked by enthusiasm. The secretaries were also reminded of their duty and privilege in the matter of reporting news items for publication in the *Journal*.

The Kent County Medical Society gave a complimentary dinner in Chatham on January 15 to Dr. C. C. White, President of the Ontario Medical Society. Dr. Magner, President Elect of the Canadian Medical Association was present and spoke. There was a large attendance of members of the Society and doctors from nearby points.

The stated meeting of Toronto Academy of Medicine was addressed by Dr. Willard O. Thompson, Clinical Professor of Medicine of the University of Illinois College of Medicine, Chicago. Professor Cole's subject was "Uses and Abuses of Sex Hormones". A subscription dinner on February 3, the night of the meeting, was largely attended.

Professor Bernardo Houssay of Buenos Aires, Nobel prize winner, gave the third Banting lecture in Convocation Hall, University of Toronto on February 5. The subject was Experimental Diabetes.

The John A. McGregor Memorial Lecture at the University of Western Ontario was delivered in London on December 5. The lecturer was Dr. H. E. McMahon Professor of Pathology, Tufts Medical College, Boston, Mass. Professor McMahon is a graduate of Western in Arts and Medicine. His subject was "Congenital Hyperplasia of the Lungs".

Dr. Frederick R. Miller, Professor of Physiology, University of Western Ontario since 1914 has retired from his professorship. Dr. Miller was a pioneer in electroencephalography and will continue his researches under a grant from the National Research Council.

Dr. Clifford Devins, past president of the Ontario Medical Association is recovering from a critical operation in Toronto General Hospital. M. H. V. CAMERON

During the last week in January, the Departments of Ophthalmology and Otolaryngology at the University of Toronto conducted a combined Refresher Course in these specialties. The course was attended by doctors from Halifax to Vancouver. The guest speakers were Dr. Paul Chandler of Harvard Medical School, Boston, and Dr. Paul H. Holinger of the University of Illinois, Chicago. This was the first refresher course put on by these Departments. Nineteen attended which was gratifying. Similar courses will be arranged in the future.

Dr. John B. Neilson, who graduated from the University of Toronto in 1937, has been appointed general superintendent of the two City hospitals in Hamilton, that is, the Hamilton General and Mount Hamilton Hospitals. He saw overseas service with the R.C.A.M.C.

Dr. E. J. K. Rudd has announced the resumption of his practice in ophthalmology at Toronto. A graduate of Queen's in 1919, he did postgraduate work in ophthalmology in Philadelphia, Toronto and Budapest. He served in R.C.A.M. from 1941 to 1946.

Dr. Robert J. Lowrie, who graduated from the University of Toronto in 1922, and who was chairman of the Section of Obstetrics and Gynæcology, New York Academy of Medicine in 1943-1944, has edited a textbook of Gynæcology written by 45 outstanding contributors from 22 medical schools in the United States, Canada and England. Among the Canadian contributors are Drs. H. B. Atlee, Halifax; W. A. Scott and H. W. Johnston, Toronto; W. P. Tew, London; and P. J. Kearns, Montreal.

Dr. Nelles Silverthorne, associate professor of pædiatrics, University of Toronto, who, since August, 1946, has been devoting all his time to the Hospital for Sick Children, has again resumed private practice.

There are 3,000 cases of tuberculosis being treated in 13 sanatoria in Ontario with about 200 cases on the waiting list. LILLIAN A. CHASE

Quebec

Le Dr Albert LeSage a été élu membre du Conseil de l'Association des médecins de langue française.

Lors de la séance de la Société Médicale de Montréal du 16 décembre dernier, le Bureau de 1948 a été constitué comme suit: Président: Dr L. H. Gariépy; vice-président, Dr J. E. Samson; secrétaire-général, Dr François Archambault; trésorier, Dr Origène Dufresne; secrétaire des séances, Dr Pierre Marion.

Lors de la session de 1947, les médecins suivant ont été élus membres du C.R.M.C.: Georges-Albert Bergeron et Jean Grandbois de Québec. 47 jeunes médecins ont été élus à la réunion de décembre 1947. On compte parmi les nouveaux élus au C.R.C.C. dont le nombre se chiffre à 79 pour la session 1947, les chirurgiens suivants: Claude Bertrand, Jean-Paul Bourque, Albert Coutu, Edouard Gagnon et Léo Jarry de Montréal; J. A. Lecours d'Ottawa; Pierre-Edouard Meunier et J. Antonio Samson de Montréal.

La Société de Chirurgia de Montréal a élu à sa présidence de Dr Edouard Desjardins.

Le Dr Albert Guilbeault a été nommé chef du service de pédiatrie de l'hôpital Notre-Dame.

Un avis était récemment publié à l'effet que l'Hon. Sénateur Elie Beauregard, le Dr Roméo Boucher et M. J. A. Leclerc s'adresseront à la Législature de Québec pour obtenir une loi spéciale les constituant, avec d'autres personnes, sous le nom de "Centre Médical de Montréal", en une corporation ayant les pouvoirs des corporations ordinaires et le droit d'exercer la médecine par l'entremise des médecins habiles à pratiquer leur profession, mais sans faire d'hospitalisation.

Les Drs Georges Leclerc et Henri Smith ont été nommés respectivement "fellow" et membre de l'American Academy of Dermatology and Syphilology.

Le 6 décembre dernier, les radiologistes de la province se sont constitués en association. Le Dr Jules Gosselin de Québec préside cette association. JEAN SAUCIER

The Montreal Medical Chirurgical Society held its annual clinical meeting at the Central Division of the Montreal General Hospital, in the outdoor patients' department, on January 23.

Members of the hospital's staff demonstrated recent advances in medical science and a number of selected clinical cases were shown in various rooms of the outpatients' department.

Following is a list of staff members of the General Hospital, who participated:

Drs. J. E. Pritchard, W. H. Mathews, J. D. MacArthur, T. T. MacFarlane, S. W. Sparling, R. E. Powell, R. G. Reid, S. A. MacDonald, Guy H. Fisk, Stuart Ramsey, B. Alexander, R. Viger, D. W. McDonald, L. J. Adams, H. N. Segall, S. R. Townsend, H. S. Mitchell, N. Feeney, McIver Smith, R. P. Howard, J. W. McKay, N. M. Brown, J. P. Robb, E. J. Smith, A. O. Freedman, G. A. Holland, R. R. Fitzgerald, E. R. Watson, J. L. Walker, S. E. Goldman, J. G. Shannon, H. M. Elder, F. B. Gurd, E. A. MacNaughton, F. D. Ackman, C. M. Gardner, G. H. Pretty, J. W. Gerrie, F. W. Woolhouse, J. F. Burgess and staff, H. Mortimer, and G. E. Hodge.

General

American Academy of Pædiatrics. The Areal Meeting of the American Academy of Pædiatrics will be held at the Hotel Statler, Buffalo, N.Y., April 29 to May 2, 1948. Members of State Societies are welcome to attend. The registration fee will be $5.00 for such non-members, together with a $5.00 registration for which each registrant receives a ticket to the banquet, making a total registration fee of $10.00. Interested members of the Canadian Medical Association are invited to attend on the same terms.

Registration may be made ahead of time by writing to Dr. C. G. Grules, Sec.-Treas., American Academy of Pædiatrics, 636 Church Street, Evanston, Ill., enclosing a cheque for $10.00, or registration may be at the time of the meeting.

The Interamerican Society of Cardiology has authorized the meeting of the III Interamerican Cardiological Congress, to be held in Chicago, Illinois, at the Michael

Reese Hospital, from June 13 to June 17, 1948. This meeting will take place immediately before the American Heart Association annual meeting, June 18 and 19, and the American Medical Association meeting the week of June 20. Inquiries regarding the Congress may be addressed to the offices of the III Interamerican Cardiological Congress, at the Michael Reese Hospital, Chicago, Illinois.

American Board of Ophthalmology practical examinations in 1948: Baltimore, May 20 to 25; Chicago, October 6 to 9. Written qualifying tests will be held annually, probably in January of each year. Applicants for the January, 1949 written qualifying test must be filed with the Secretary before July 1, 1948.

The 1947 Canada Year Book is now available for distribution by authorization of the Hon. James A. MacKinnon, Minister of Trade and Commerce. This publication will be supplied to the public by the King's Printer, Ottawa at the price of $2.00 per copy (clothbound). This sum covers merely the cost of paper, presswork and binding, and leaves no margin for advertising. By special concession, teachers, university students and ministers of religion may obtain paper-bound copies at $1.00 each by applying to the Dominion Statistician, Dominion Bureau of Statistics, Ottawa. The number set aside for this purpose is restricted and early application is desirable.

Some of the special articles in this issue are: Canadian Citizenship; Welfare and Family Allowances; Crime and Juvenile Delinquency; Control of Forest Insect Pests; and many others. There has also been considerable re-arrangement of the material. There are 12 maps and 38 diagrams.

BOOK REVIEWS

Developmental Diagnosis. A. Gesell and C. S. Amatruda. 496 pp., illust., 2nd ed. $7.50. Paul B. Hoeber, Inc., New York and London, 1947.

The authors have added to their previous work on developmental studies in infants and young children. The method of examination of an infant is outlined again and the forms of development concisely presented. There is included a developmental study of Amentia of various degrees, endocrine and convulsive disorders, cerebral birth injury, blindness, deafness, prematurity. There is an interesting chapter on adoption, discussing the doctor's responsibility and outlining the many difficulties that may arise. Emphasis is thereby placed on the importance of responsible approved agencies for placing children for adoption. The pædiatrician has always been obliged to concern himself with behaviour problems in children. Recently he has become more interested and informed on the details of development and behaviour. Dr. Gesell in a chapter on developmental pædiatrics suggests ways in which the pædiatrician can apply the data assembled on development to infants and young children.

Hand-book of Ocular Therapeutics. By the late Sanford R. Gifford. Revised by Derrick Vail, Professor of Ophthalmology, North-Western University Medical School. 336 pp., illust., 4th ed. $5.00. Macmillan Co. of Canada, Ltd., Toronto, 1947.

The fact that this is the fourth edition of this book is an indication of its popularity. It has been revised and brought up to date and is an extremely valuable and handy volume for ready reference in the treatment of the ordinary cases which occur daily in the practice of an ophthalmologist. The chapter on vitamins is a concise and reasonable presentation of their place and use in ophthalmic practice. The chapter on drugs used against infection is comprehensive and includes a sane analysis of the value of the sulfa drugs and the antibiotics. The book is a most valuable adjunct to an office library.

Headache. L. G. Moench, Assistant Clinical Professor of Medicine, University of Utah School of Medicine. 207 pp., illust. $3.50. The Year Book Publishers, Inc., Chicago, 1947.

This book represents at its best the contemporary method of concise and summary exposition of the extensive literature which has grown up about an intricate medical subject. The author's general perspective makes for clarity. He leads off with an account of the pain-sensitive structures of the head and the pathological physiology of headache. He then deals with headache on an etiological basis—intracranial lesions, cranial nerve neuralgias, the headache of ocular and nasal origin, that due to systemic disorders and histamine, ending with migraine and the headache of emotional origin. In each section the anatomy and physiology are well developed. There are illustrative case reports, treatment is handled in a realistic fashion and a select bibliography rounds off the discussion. Probably the most effective feature of the book is the admirable use which is made of diagrams and tables, setting out essential data, differential diagnosis, spinal fluid findings in various conditions, the profile of various intracranial lesions. The skilful and imaginative use of such material gives clarity and integration to the discussion of a subject which can so easily become lost in complexity and detail. This makes the book extremely valuable for quick reference purposes. On the summary side, the section dealing with migraine which can be read in a few minutes sets out the essential points from the vast amount of data on this subject.

The book achieves its aim in a most satisfactory way. The format and type make it handy and readable. In outline, in the use of diagrammatic illustration and direct medical prose, it makes available to the physician what it would take him months to acquire in directed reading. It is a book which should be a necessity for every young medical practitioner and which should be of value to every physician.

Medicine. A. E. Clark-Kennedy, Physician to the London Hospital and Dean of the Medical School (two volumes). Vol. 1, 383 pp. E. & S. Livingstone Ltd., Edinburgh, 1947.

This is an unusual and most interesting book. It has been prepared in two volumes. Volume I—"The Patient and his Disease" only is under review. It is not the usual approach of a textbook of Medicine, as the various diseases are not described in a didactic manner. As the name implies, this volume is an effort to stimulate a comprehensive viewpoint of the patient from the structural, functional and emotional pattern. It is the practice and art of medicine outlined by an experienced clinician, and teacher. The author reveals how one can study the pathological state in terms of effect upon the individual's functions. It is this appreciation of normal physiology versus pathological physiology that is the keynote of good therapy as well as prognosis. The author considers the emotions in the etiology of disease both as an associated condition and a primary fault. He endeavours to explain how function may be impaired in such conditions. The composite picture gained proved as satisfactory to the patient as it does to the doctor. It is true that some conditions defy a rational explanation in the light of our present knowledge, but these we can treat empirically, when our approach to the patient is so complete. This is not just a book for the physician, but one that diffuses its concept to all branches of medicine and surgery alike. Whether one is a student, a general practitioner or a specialist, the reviewer feels that "something" constructive will be gained by study of this book.

Microbial Antagonisms and Antibiotic Substances. S. A. Waksman, Professor of Microbiology, Rutgers University. 415 pp., illust., 2nd ed. $4.00. The Commonwealth Fund, New York, 1947.

In the brief space of two years since the first publication of Dr. Waksman's scholarly and comprehensive

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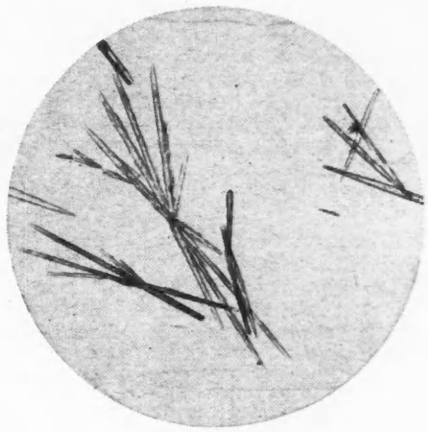

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monograph, notable and rapid advances have been made in this field, stimulated by the interest aroused from the application of antibiotic substances to the treatment of disease. The author has now increased the value of his book by its revision, with the addition of new material drawn from his own researches and from a survey of the experiences of other workers. The form and order of subject presentation is preserved. As before, the fourteen chapters cover, with well documented detail, such topics as those of microbial antagonisms in nature, the various microscopic forms of antagonists and their antagonistic relationships; cultivation of antagonistic micro-organisms, and methods of measuring antibiotic action. Of particular interest are the chapters in which the new knowledge of the chemistry and mode of action and isolation of antibiotics is reviewed with special attention given to penicillin and streptomycin, the latter, as Dr. Waksman points out, a laboratory curiosity in 1943 and during the writing of the first edition. As in the previous edition, the clinician searching only for information of immediate use in the treatment of his cases will find little. But if the book is read only by specialists, then the practising physician will lose a wealth of interesting and profitable information on a fascinating and important subject.

Preoperative and Postoperative Care. W. J. Tourish, Demonstrator of Surgery and Chief Clinical Assistant in Surgery, Jefferson Medical College and Hospital; and F. B. Wagner, Jr., Instructor in Surgery and Assistant in Surgery, Jefferson Medical College and Hospital. 350 pp., illust. $6.00. F. A. Davis Co., Philadelphia, 1947.

A useful book designed for the busy intern, also for the surgeon himself. One might describe it as a handbook on the subjects of preoperative and postoperative care. The material is organized in three sections of chapters, *i.e.*, pre- and post-operative care, general and specific; technique of bedside procedures on surgical cases; and a group of chapters on special surgical cases—urological, neuro-surgical and gynæcological. Anyone who has had experience as an intern will have noticed the varied character of the routines of individual surgeons in the same hospital. For this reason some surgeons may quibble over the standardized care laid down in this book. The reader is reminded that such a book must be clear and dogmatic for its purpose, and though a certain routine may not be used by him, it is hoped that he will not condemn the book for that reason. The routine laid down in this book represents an average of what is carried out in most of the large American clinics and is the result of a vast amount of surgical study and experience.

As a valuable guide in procedure it should become one of the most frequently consulted volumes in the Medical Library.

Public Health Law. J. A. Tobey, Member of the New York Bar; Fellow, American Public Health Association; Associate Fellow, American Medical Association. 419 pp., 3rd ed. $4.50. The Commonwealth Fund, New York, 1947.

A most timely and valuable contribution to the problem of public health administration. Owing to the remarkable expansion of public health activities in recent years, there has arisen an urgent need for the clarification of the legal aspect of many of the problems that now confront the sanatarian. This need the author has undertaken to meet. Because of his wide experience both as a health officer and as a member of the New York Bar, he is able to present in an interesting and practical form the information that is needed, not only by the sanatarian, but also by those who are specially engaged in law enforcement. While the work is of primary interest to the Health Officer, it also contains much valuable advice for the ordinary medical practitioner who is unacquainted with the fine points of legal procedure.

The author insists that "sanitary instruction is of greater importance than sanitary legislation" in the promotion of health observances in any community, yet, at the same time, he recognizes that there are occasions when legal action must be taken. Where action is necessary, the case should be so well prepared that there is no danger of losing it, for "losing a court action always lowers the prestige of the Health Department".

While the author bases his remarks largely on laws and procedures in the United Sates, there is so much similarity with our own regulations that the work is equally valuable to Canadians. This book should be in every medical library, and particularly in the library of every Health Department.

Synopsis of Anæsthesia. J. A. Lee, Consultant Anæsthetist to Southend General Hospital. 254 pp., illust. $3.15. John Wright & Sons Ltd., Bristol; Macmillan Co. of Canada Ltd., Toronto, 1947.

Those who are familiar with Tidy's "Synopsis of Medicine" and Hey Groves' "Synopsis of Surgery" by the same publishers will welcome this addition to two old time friends of students everywhere. The same general plan of presentation is followed as in the other two synopses and the author has managed to cover the entire field of modern anæsthesia in a very readable manner. The illustrations are well picked and assist considerably in interpreting the text. The book is not dogmatic but treats the various techniques in a most impartial manner.

The synoptic treatment of the subject makes this book both valuable for a quick review of the entire subject for examination purposes and as a ready reference for quick answers to any anæsthesia problems without the necessity of reading through a great deal of irrelevant matter. Important references are inserted into the body of the text where needed. An extensive index completes the attractions of this most valuable little guide to modern anæsthesia.

Textbook of Pathology. E. T. Bell, Professor of Pathology in the University of Minnesota, Minneapolis, Minn. 910 pp., illust., 6th ed. $10.00. Lea & Febiger, Philadelphia; Macmillan Co. of Canada, Toronto, 1947.

This new edition of Bell's popular textbook of pathology differs little from previous editions, following the same pattern and method of teaching that was used in the older editions. Some new and revised material has been added and the number of illustrations has been substantially increased. The text is characterized by its brevity and simplicity. Discussion and conjecture are so rigorously avoided that many sections are in the nature of simple definitions rather than a presentation of the available pathological knowledge. It is unfortunate that the author has seen fit to devote little more than a page to two such important phenomena as shock and healing of wounds, while appropriating as much or more space for such conditions as amyloid disease or Schüller-Christian's disease. On the other hand, the author makes liberal use of statistical data dealing with the morbidity and mortality of many diseases so that the student may form a useful concept of their relative practical importance. As always, the chapter dealing with renal disorders is the best that is to be found in any text. Indeed, this chapter alone provides sufficient reason for the purchase of the book, for a careful study of its contents will amply repay both the student and practitioner. While the text is sufficiently up-to-date to include a few lines about the pathological effects of the atomic bomb, it shares a fault common to the great majority of such books. There is no discussion of the effects of the antibiotics on the pathogenesis of disease, nor is there any discussion of some of the newer concepts of generalized tissue disease as opposed to simple organ pathology. The student will find that this is a useful and uncomplicated text. It will be of less use to the practitioner and of little value to the pathologist.

The Foot and Ankle. P. Lewin, Associate Professor of Bone and Joint Surgery, and Acting Head of Department, Northwestern University Medical School. 847 pp., illust., 3rd ed. $11.00. Lea & Febiger, Philadelphia; Macmillan Co. of Canada, Toronto, 1947.

In his dedication to Allan P. Kanavel, the author tells how his friend advised him "to write a book that will tell the general practitioner what to do for the common conditions that occur in and around the foot." Dr. Levin has done just this. This is a book that might well be on the desk, for constant reference, of every general practitioner, every obstetrician and every pædiatrician, as well as every orthopædist and industrial surgeon. His directions for treatment and care are clear and authoritative, and he constantly gives his own line of treatment in full, while giving that of other leading men. His style is pleasant and epigrammatic, and he is given to aphorisms, of which he has at the end of the book a whole chapter, describing them as "pedigrams".

Minor, everyday ailments receive a great deal of attention. Shoes, the care of the nails, foot sanitation, corns and calluses, and many other similar minutiæ which are commonly omitted in such a book, are thoroughly dealt with. A completely new and wholly admirable departure, is his insistence on the value of the chiropodist's work, as an auxiliary to medical treatment, and he emphasizes the need for chiropodists in several conditions, notably in vascular lesions. Speaking of diabetes, he says, "In no other disease is such co-operation necessary between patient and physician and chiropodist as in diabetes". This is the only textbook to our knowledge at least, that has emphasized this important point, and the experience of a great many of the largest hospitals in the United States, bears out his contention. One feels that the author has fully realized his ambition—to make of his book a *vade mecum* for all who practise medicine, especially the general practitioner.

Les acquisitions médicales récentes. Ed. Médicales Flammarion, Paris, 1947.

Some of the best French scientists give in this book a review of the recent scientific work in France. Tzanck gives his view on the problems of blood transfusion, Hamburger on the renal secretion and on the sulfonamides. Very interesting is the work of Halpern on the synthetic anti-histamine products. Some other prominent French research-workers contribute to this very interesting book.

BOOKS RECEIVED

Mental Health. J. H. Ewen, Physician and Lecturer in Psychological Medicine, Westminster Hospital. 270 pp. $3.15. Edward Arnold & Company, London; Macmillan Co. of Canada, Toronto, 1947.

Physical Medicine in General Practice. W. Bierman, Attending Physical Therapist, Mount Sinai Hospital. 686 pp., illust., 2nd ed. $8.00. Paul B. Hoeber, Inc., New York, 1947.

Aids to Diagnosis and Treatment of Diseases of Children. F. M. B. Allen, Lecturer in infant hygiene and diseases of children, Queen's University, Belfast. 268 pp., 8th ed. $1.50. Baillière, Tindall & Cox, 7 and 8 Henrietta Street, Covent Garden, W.C.2; Macmillan Co. of Canada, Toronto, 1947.

Conduct of Life Assurance Examinations. E. M. Brockbank, Honorary Consulting Physician, The Royal Infirmary, Manchester. 176 pp., 2nd ed. 12s. 6d. H. K. Lewis & Co. Ltd., London, 1947.

Cornell Conferences on Therapy. Volume 2. Edited by Harry Gold. 354 pp. $3.75. Macmillan Company, New York and Toronto, 1947.

Health Services in England. R. C. Wofinden. 191 pp. $2.50. John Wright & Sons, Bristol, England; Macmillan Co. of Canada, Toronto, 1947.